

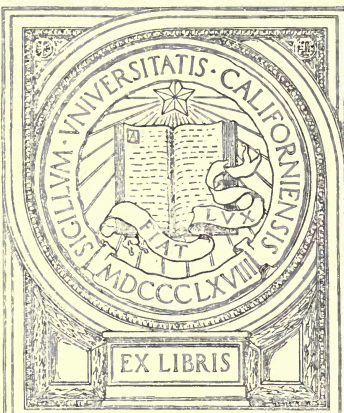
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THE  
BRITISH MOSS-FLORA.

BY

R. BRAITHWAITE, M.D., F.L.S., &c.

(SOC. CRITTOG. ITAL.—SOC. PRO FAUNA ET FL. FENN.—SOC. NAT. DES SCIEN. NAT. DE CHERB.  
SOC. CORRESP.)

VOL. III.

PLEUROCARPOUS MOSSES

AND

SPHAGNA.

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" The means therefore which unto us are lent,  
Him to behold, is on His workes to looke,  
Which He hath made in beaultie excellent:  
And in the same, as in a brazen booke,  
To read enregister'd in every nooke  
His goodnesse."

*Spenser.*

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THE  
BRITISH MOSS-FLORA.

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VOL. III.  
PLEUROCARPI.

HYPNACEÆ, PTERYGOPHYLLACEÆ, NECKERACEÆ,  
GENERAL INDEX.

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## FAMILIES OF PLEUROCARPOUS MOSSES.

- 
1. HYPNACEÆ.
  2. PTERYGOPHYLLACEÆ.
  3. NECKERACEÆ.





HYPNACEÆ.

Subf. 1. *LESKEÆ*.

THUIDIUM BR. SCH.

1. *Thuidium tamariscifolium* (Neck.) Lindb.
2. — *delicatulum* (L.) Mitt.
3. — *recognitum* (Hed.) Lindb.
4. — *abietinum* (L.) B. S.
5. — *hystricosum* Mitt.
6. — *Blandowii* (W. M.) Schp.

LESKEA HED.

1. *Leskea catenulata* (Brid.) Mitt.
2. — *nervosa* (Brid.) Myr.
3. — *polycarpa* Ehr.

ANOMODON HK. TAY.

1. *Anomodon viticulosus* (L.) H. T.
2. — *attenuatus* (Schr.) Hueb.
3. — *longifolius* (Schl.) Hartm.

Subf. 2. *HYPNÆ*.

AMBLYSTEGIUM B. S.

1. *Amblys. filicinum* (L.) De Not.
2. — *fallax* (Brid.) Milde.
3. — *curvicaule* (Jur.) Dix.
4. — *irriguum* (Wils.) Sch.
5. — *fluviatile* (Sw.) Sch.
6. — *varium* (Hed.) Lindb.
7. — *serpens* (L.) B. S.
8. — *Juratzkæ* Schp.
9. — *radicale* (P. B.) Mitt.
10. — *confervoides* (Brid.) B. S.
11. — *Sprucei* (Bruch.) B. S.
12. — *riparium* (L.) B. S.
13. — *Kochii* (B. S.) Lindb.
14. — *elodes* (Spr.) Lindb.
15. — *chrysophyllum* (Brid.) Not.

16. — *protensum* (Brid.) Lindb.
17. — *stellatum* (Schr.) Lindb.
18. — *polygamum* B. S.
19. — *glaucum* (Lmk.) Lindb.
20. — *decipens* De Not.
21. — *falcatum* (Brid.) D. N.
22. — *Sendtneri* (Sch.) D. N.
23. — *intermedium* (Lindb.)
24. — *revolvens* (Sw.) D. N.
25. — *lycopodioides* (Neck.) D. N.
26. — *vernicosum* (Lindb.)
27. — *aduncum* (L.) Lindb.
28. — *exannulatum* (Gum.) D. N.
29. — *fruticans* (L.) D. N.
30. — *Kneiffii* Schp.
31. — *scorpioides* (L.) Lindb.
32. — *Smithii* (Sw.) Lindb.
33. — *dilatatum* (W.) Lindb.
34. — *molle* (Dick.) Lindb.
35. — *ochraceum* (Tur.) Lindb.
36. — *palustre* (Hud.) Lindb.
37. — *engyrium* (Sch.) Lindb.
38. — *giganteum* (Sch.) D. N.
39. — *cordifolium* (Hed.) D. N.
40. — *sarmentosum* (Wahl.) D. N.
41. — *stramineum* (Dick.) D. N.
42. — *trifarum* (W. M.) D. N.

HYPNUM DILL.

1. *Hypnum Hochstetteri* Sch.
2. — *purum* L.
3. — *illecebrium* P. B.
4. — *cæspitosum* Wil.
5. — *striatum* Schreb.
6. — *meridionale* Schp.
7. — *striatum* Spruce.
8. — *strigosum* Hoff.
9. — *circinatum* Brid.
10. — *pallidirostre* A. Braun.
11. — *prælongum* L.
12. — *Swartzii* Tur.
13. — *Schleicheri* Hed.
14. — *speciosum* Brid.
15. — *hians* Hed.
16. — *crassinerve* Tay.
17. — *Teesdalei* Sm.
18. — *curvisetum* Brid.
19. — *litoreum* D. N.
20. — *Algirianum* Brid.
21. — *pilliferum* Schreb.
22. — *cirrosum* Schw.
23. — *rusciforme* Neck.
24. — *murale* Neck.
25. — *confertum* (Dick.) B. S.
26. — *megapolitanum* Blan.
27. — *rotundifolium* Schp.
28. — *velutinum* L.
29. — *seudoplumosum* Brid.
30. — *viride* Lmk.
31. — *reflexum* Stark.
32. — *Starkei* Brid.
33. — *campestre* Bruch.
34. — *glaciale* (B. S.) Hart.
35. — *curtum* Lindb.
36. — *rutabulum* L.
37. — *rivulare* Bruch.
38. — *plumosum* Hud.
39. — *albicans* Neck.
40. — *glareosum* Bruch.
41. — *trichoides* Neck.
42. — *lutescens* Hud.
43. — *sericeum* L.

LESQUEREUXIA B. S.

1. *Lesq. plicata* (Schl.) Lindb.
2. — *filamentosa* (Dick.) Lindb.
3. — *atrovirens* (Dick.) Best.
4. — *saxicola* Mol.

ISOTHECIUM BRID.

1. *Is. myosuroides* (L.) Brid.
2. — *viviparum* (Neck.) Lindb.

PTEROGONIUM SW.

1. *Pt. ornithopodioides* (Hud.) Lindb.

PTERYGYANDRUM HED.

1. *Pt. filiforme* (Tim.) Hed.

HELICODONTIUM SCHW.

1. *Hel. pulvinatam* (Wahl.)

HABRODON SCH.

1. *Hab. perpusillus* (D. N.) Lindb.

Subf. 3. *STEREODONTÆ*.

MYURELLA B. S.

1. *Myr. tenerrima* (Br.) Lindb.
2. — *julacea* (Vil.) B. S.

HETEROCLADIUM B. S.

1. *Het. squarrosulum* (Voit) L.
2. — *heteropterum* (Bruch) B. S.

HYLOCOMIUM B. S.

1. *Hyl. umbratum* (Ehr.) B. S.
2. — *brevirostre* (Ehr.) B. S.
3. — *Pyrenaicum* (Spr.) Lindb.
4. — *proliferum* (L.) Lindb.
5. — *parietinum* (L.) Lindb.
6. — *triquetrum* (L.) Lindb.
7. — *squarrosum* (L.) B. S.
8. — *loreum* (L.) B. S.
9. — *rugosum* (L.) D. N.

CAMPYLIUM (SULL.)

1. *Cam. Halleri* (Sw.) Lindb.
2. — *hispidulum* (Br.) Mitt.

CTENIDIUM MITT.

1. *Cten. molluscum* (Hed.) Mitt.
2. — *procerrimum* Mol.

HYOCOMIUM SCH.

1. *Hy. flagellare* (Dick.) Schp.

PTILIUM (SULL.) D. N.

1. *Pt. crista-castrensis* (L.) D. N.

SEMATOPHYLLUM MITT.

1. *Sem. demissum* (W.) Mitt.
2. — *micans* (W.)

STEREODON BRID.

1. *Ster. Lindbergii* Mitt.
2. — *imponens* (Hed.) Br.
3. — *Bambergeri* (Sch.)
4. — *cupressiformis* (L.)
5. — *resupinatus* (Wils.)
6. — *revolutus* Mitt.
7. — *Canariensis* Mitt.
8. — *circinalis* (Hook.) Brid.
9. — *callichrous* Brid.
10. — *hamulosus* (Br.) Lindb.
11. — *incurvatus* (Schr.) Mitt.
12. — *polyanthos* (Schr.) Mitt.
13. — *subrufus* (W.) Lindb.
14. — *rafescens* (Dick.) Mitt.

ISOPTERYGIUM MITT.

1. *Is. pratense* (Koch) Lindb.
2. — *Muelleri* (Sch.) Lindb.
3. — *depressum* (Bruch) Mitt.
4. — *elegans* (Hook.) Lindb.
5. — *pulchellum* (Dick.) Lindb.
6. — *repens* (Poll.) Lindb.

PLAGIOTHECIUM B. S.

1. *Pl. striatellum* (Brid.) Lindb.
2. — *latebricola* (W.) B. S.
3. — *undulatum* (L.) B. S.
4. — *denticulatum* (L.) B. S.
5. — *silvaticum* (Huds.) Lindb.
6. — *succulentum* (W.) Lindb.

ACROCLADIUM MITT.

1. *Ac. cuspidatum* (L.) Lindb.

ENTODON C. MUEL.

1. *Ent. orthocarpus* (La Pyl.) Lindb.



## MUSCI PLEUROCARPI.

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Inflorescence gemmiform, produced in the axils of leaves on the main stem, or on the secondary branches, so that the fruit is always lateral. Stem much branched, prostrate, decumbent or less frequently erect, sometimes floating or pendent.

### *Fam. 19. HYPNACEÆ.*

Plants very variable in size and habit, generally procumbent and much branched, pinnate or with the branches irregular. Leaves in many rows, spreading on all sides, or falcate and secund, or complanate, smooth or occasionally papillose, ovate or lanceolate, entire or serrated; usually with one nerve, sometimes with two nerves, or nerveless, cells prosenchymatous, narrow and vermicular, rarely ovoid and incrassate, those at basal angles usually quadrate and often vesicular or coloured. Calyptra cucullate, smooth or very rarely somewhat hairy. Capsule on a long seta, more or less incurved and cernuous, rarely regular and erect; peristome of 16 teeth, lanceolate-subulate, trabeculate, with a zigzag divisural line, lamellose internally, endostome a carinate-plicate basal membrane, with 16 processes and 1—3 more or less perfect cilia interposed between them.

The vast group of mosses embraced by the Hypnaceæ has taxed the powers of all bryologists to arrange satisfactorily into genera; for unlike the acrocarpous division, they possess so much uniformity in habit and structure, that they defy all sharp distinctions, and we have thus to depend on characters of less importance than those used for the acrocarpi, and rely more on natural habit.

C. Mueller and Hampe maintained one huge genus *Hypnum* for most of the species, breaking it up into sections or subgenera, depending on the habit or foliage; Schimper went too far in the opposite direction, and established many genera on trivial differences, such as an obtuse or rostrate operculum. Following Mitten and Lindberg, I have endeavoured to steer a middle course and retained such genera as presented the strongest natural characters and minor sections for groups of allied species.

The study of these mosses (as indeed of all species), must be carried out in connection with their congeners throughout the world, for in several instances we have in Europe but one or two outlying stragglers of some great

tropical genus, as e.g. *Pterygophyllum*, *Thuidium*, *Hypnum micans*, *demissum*, &c., and these foreign allies often help us much in understanding our familiar friends.

Subf. 1. LESKEEÆ. Primary stem creeping, with decumbent branches, and the primary branches forming secondary stems, pinnate or vaguely branched, often with paraphyllia. Leaves patent or secund with a stout single nerve, opaque, papillose: cells incrassate, minute and rounded above, hexagono-rectangular or elongated at base. Capsule oblique and curved, or erect and symmetric, cilia none or rudimentary, sometimes perfect.

# 1. THUIDIUM Br. Sch.

Bry. eur. fasc. 49—51 (1852).

Primary stem but little divided, prostrate, densely radiculose, or erect with few radicles, pinnate, bi- or tri-pinnate. Stem leaves larger, decurrent, cordate-triangular, acuminate, papillose on one or both sides; paraphyllia numerous, polymorphous. Branch leaves small, ovato-lanceolate, the cells minute, rounded-hexagonal, the basal oblong-quadrate. Capsule oblong, cylindraceous, subarcuate; teeth of peristome long, densely articulate, endostome with 3—4 cilia. Terrestrial.—Der. *Thuia*, the arbor-vitæ tree, ædøs likeness.

A lovely genus of mosses including some 140 species, all remarkable for their flat feather-like mode of growth. Some of the species approach each other closely, and we are much indebted to Lindberg's acumen in detecting the difference in the points of the ramuline leaves, and the perichæatial bracts when present afford valuable characters.

## CLAVIS TO THE SPECIES.

Stem tripinnate, apical cell of ramuline leaves conic, smooth.	<i>tamariscifolium</i> .
— bipinnate, apical cell truncate, papillose.	
Ap. cell deeply notched, papillæ spiniform.	<i>recognitum</i> .
— with shallow notch, pap. short, forked.	<i>delicatulum</i> .
— pinnate, erect.	
Dioicous; inhabiting dry banks.	
Cells of branch-leaves roundish.	<i>abietinum</i> .
— longish oval.	<i>hystricosum</i> .
Autoicous; inhabiting bogs.	<i>Blandowii</i> .

Sect. 1. EUTHUIDIUM Lindb. Stems prostrate, trailing, bi-tripinnate, the branches arranged in a single row on each side of stem.

# 1. THUIDIUM TAMARISCIFOLIUM (Neck.) Lindb.

Dioicous; stems long and trailing, tripinnate. Cauline leaves deltoid-cordate at base, suddenly lanceolate, crenulate at margin.

Perich. bracts with many long cilia at margin and a long strap-shaped point. Apex of ramuline leaves a single smooth cell. (T. LXXXV, A.)

SYN.—*Hyphnum repens filicinum minus, luteo-virens* DILL. Cat. Giss. 217 (1718), et in RAY Synops. 3 ed. 86 (1724).

*Hyphnum filicinum, Tamarisci foliis minoribus, non splendidibus* DILL. Hist. musc. 276, t. 35, f. 14 (1741), et Herbar.

*Hyphnum proliferum* (non L.), HUDS. Fl. angl. 422 (1762). WEISS Cr. goett. 230 (1770). WITHER. Bot. arr. ii, 684 (1776). LIGHTF. Fl. scot. ii, 750 (1777). CURT. Fl. Lond. f. I, t. 72 (1777). RELH. Fl. cant. 434 (1785). ROTH Tent. fl. germ. i, 467 (1788). SIBTH. Fl. oxon. 294 (1794). HOFFM. Deutsch. fl. ii, 60 (1796). SWARTZ Musc. succ. 53 (1799). ABBOT Fl. Bedf. 248 (1798). HULL Br. fl. P. 2, 270 (1799). SM. Fl. brit. 1297 (1804), Eng. Bot. t. 1494. TURN. Musc. hib. 157 (1804). HOOK. TAY. Musc. br. 103 (1818). HOOK. Fl. scot. P. 2, 145 (1821). GRAY Nat. arr. br. pl. i, 759 (1821).

*Hyphnum tamariscifolium* NECK. Meth. musc. 158, excl. Var.  $\beta$  (1771).

*Hyphnum parietinum* (non L.), POLL. Pl. Palat. iii, 134 (1777). WEB. Spic. fl. goett. 61 (1778). WILLD. Fl. berol. 322 (1787). BRID. Musc. rec. II, P. II, 71 (1801).

*Hyphnum tamariscinum* HEDW. Sp. musc. 261 (excl. syn. L. et VAILL.), t. 67, figg. 1—5 (1801). WEB. MOHR Bot. Tasch. 333 (1807). BRID. Sp. musc. II, 138 (1812), Mant. 164 (1819), Bry. univ. ii, 438 (1827). SCHWAEGL. Suppl. I, P. II, 236 (1816). HUEBEN. Musc. germ. 658 (1833). DE NOT. Syllab. 16 (1838). RABENH. D. kr. fl. 2, S. 3, 266 (1848). WILS. Bry. br. 380, t. 57 (1855). HOBK. Synops. 146 (1873).

*Hyphnum delicatulum* C. MUELL. Synops. ii, 484 (1851).

*Thuidium tamariscinum*, SCHIMP. Bry. eur. Fasc. 49—51, p. 7, t. 2 et 3 (1852), Synops. 498 (1860), 2 ed. 613. BERK. Handb. br. m. 135, t. 8, f. 4 (1863). MILDE Bry. siles. 267 (1869). DE NOT. Epilogo, 231 (1869). HOBK. Synops. 2 ed. 193 (1873). HUSN. Musc. gall. 309 t. 88 (1892). BOUL. musc. de Fr. 155 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 828 (1895). DIXON & JAMESON Stud. Handb. 384 (1896).

*Thuidium tamariscifolium* LINDB. Oefv. Finska vet. soc. foerh. x, 8 (1868), et in Not. ur Saells. Fn. Fl. fenn. xiii, 415 (1874).

Dioicous; in loose wide dull deep-green or yellow-green tufts, ochreous-brown at base. Stems tripinnate, very long, trailing and fixed by numerous purple radicles, densely coated with lanceolate or branched paraphyllia, stoloniform and rooting at the apex. Stem leaves distant, from a decurrent deltoid-obcordate base, deeply concave and 4-sulcate, suddenly narrowed into a lanceolate irregularly serrulate recurved point; both surfaces covered with acute papillæ curved upward; margin subrevolute, crenulate, nerve ending abruptly below the apex. Branch-leaves ovate, concave, more chlorophyllose; ramuline leaves minute, ovato-lanceolate, the apex formed of a single elongated hyaline smooth cell. Perich. bracts pale, inner plicate, long and lanceolate, suddenly running out into a serrated flexuose strap-like hair three times the length of bract, the margins of the latter in upper half fringed with very long simple or branched filiform toothed cilia, outer not ciliate, serrated papillose. Capsule on a long smooth rufous-purple seta, large, rufous, elongate-cylindrical, arcuate, slightly contracted below the mouth when dry, lid of the same colour, conico-rostrate, annulus indistinct.



Peristome ferruginous, the teeth long, closely trabeculate below; processes of endostome entire or perforated in the keel, cilia 3—4.

Male plant small, the infl. with many ovate bracts, recurved at apex.

HAB.—Shady banks and in woods, common. Fr. 10—11 not common.

Common as this moss is here, it does not appear to exist in N. America, or has never been distinguished from the two allied species. To the other European species must now be added *T. Philiberti* LIMPR. *T. intermedium* PHILIB. (non MITTEN), closely resembling *T. recognitum* in the non-ciliated perich. bracts, and probably not specifically different from it; it is described by Philibert in Rev. bryol. 1893, p. 33.\*

Great confusion has existed between *T. tamariscifolium* and *T. recognitum*, although Smith clearly recognized the specific value of the latter, and it is interesting to read his observations on it in Trans. Linnean Soc. xiii, 459, and Hooker's remarks in Musc. brit. 2 ed. 171 (1827).

The male plant is generally very small and insignificant.

## 2. *THUIDIUM DELICATULUM* (L. Hedw.) Mitt.

Dioicous; stems trailing, bipinnate. Cauline leaves widely cordato-triangular, with a short lanceolate bluntish point, revolute at margin. Perich. bracts ciliate in upper half. Apex of ramuline leaves with the terminal cell crowned by 3—4 short acute papillæ. (T. LXXXV, B.)

SYN.—*Hypnum filicinum*, *tamarisci foliis minimis non splendentibus, setis, capsulis et alis brevioribus* DILL. Hist. musc. app. 546, t. 83, f. 6 (1741) et Herb.

*Hypnum delicatulum* L. Sp. pl. 1125, the American plant only (1753). ROTH Tent. Fl. germ. i, 467 (1788). HEDW. Stirp. cr. iv, 87, t. 33 (1797). Sp. Musc. 260. LESQ. JAMES MOSS. N. Amer. 325 (1884).

*Hypnum tamariscinum* ♂. *delicatulum* BRID. Bry. univ. ii, 441 (1827).

*Hypnum proliferum*, *H. tamariscinum* et *Thuidium tamariscinum* Auct. Americ.

*Thuidium delicatulum* MITT. in Journ. Linn. Soc. xii, 578 (1869). LINDB. Not. ur Saells. Fn. Fl. fenn. foer. xiii, 41f (1874). SCHIMP. Synops. 2 ed. 615 (1876). PHILIB. in Rev. bryol. 1880, p. 99. BOULAY Musc. Fr. 157 (1884). HUSN. Musc. gall. 309, t. 88 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 832 (1895). DIX. & JAMES. Stud. Handb. 385 (1896).

Dioicous; in loose yellow-green tufts, brown at base, stem bipinnate, with filiform, branched, papillose paraphyllia. Stem leaves from a wide cordate orange base, triangular, with a short lanceolate recurved point; the margin revolute for nearly all the length, nerve vanishing at  $\frac{1}{4}$  the length. Branch-leaves ovate, acute, nerve lost below the point; ramuline leaves ovate, nerved to middle, the apical cell oval, crowned with 3—4 acute papillæ; cells roundish-oval, the papillæ low and often bluntly forked. Outer perich. bracts smooth or

\* This has just been detected by Mr. Dixon (Craig Chaillead, 1893).

papillose, inner erect, lanceolate, irregularly plicate, suddenly narrowed into a long serrulate subula, the margin with a few simple or rarely branched, erect nearly smooth cilia. Capsule on a smooth red seta, curved, longish cylindric, rufous; lid conic with an oblique beak; annulus of 2 rows of narrow cells. Peristome yellow-brown, endostome yellow with 3 cilia.

HAB.—Damp woods, very rare. Fr. 10.

Tyn-y-groes, N. Wales, c. fr. (*Holt* Dec., 1885)!! *Lodore*, c. fr. (*Binstead* Dec., 1889)!! growing intermixed with *T. tamariscifolium*.

This plant has now been found in various parts of France, Switzerland, Austria, Germany and Scandinavia; and indeed was found first in Germany by Roth in 1798. Its identity was first determined by Lindberg on male specimens collected in the island of Hogland. In America it takes the place of our *T. tamariscifolium*.

### 3. THUIDIUM RECOGNITUM (*Hedw.*) *Lindb.*

Dioicous; stem trailing, bipinnate. Cauline leaves widely cordato-triangular, acuminate, densely papillose at back. Perich. bracts not ciliate. Apex of ramuline leaves broadly emarginate, the terminal cell crowned by 3—4 spinulose papillæ. (T. LXXXV, C.)

SYN.—*Hypnum delicatulum* L. Sp. pl. 1125, the European plant only (1753). *EHRH.* in *Hann. mag.* 1782, p. 480. *WILLD.* Fl. berol. 321 (1787). *SCHRANK* Fl. Salisb. n. 841 (1792). *WAHLENB.* Fl. carpat. 358 (1814). *SCHWAEGL.* Suppl. I, P. II, 136 (1816). *HUEBEN.* Musc. germ. 659 (1833). *WILS.* Bry. br. 379, t. 57 (1855). *HOBK.* Synops. 146 (1873).

*Hypnum tamariscifolium* Var.  $\beta$ . *NECK.* Meth. musc. 158, excl. syn. (1771).

*Hypnum recognitum* *HEDW.* Stirp. cr. iv, 92, t. 35 (1797). *ROTH* Fl. germ. iii, 279 (1800). *BRID.* Musc. rec. II, P. II, 74 (1801). *SM.* Fl. brit. 1298 (1804), Eng. Bot. t. 1495; Trans. Lin. Soc. xiii, 459 (1821). *LESQ.* *JAMES* Moss. N. Amer. 325 (1884). *SCHULTZ* Fl. Starg. 316 (1806). *FUNCK* Moost. 60, t. 42 (1821). *RABENH.* D. kr. fl. II, S. 3, 266 (1848).

*Hypnum tamariscinum*  $\beta$ . *recognitum* *BRID.* Sp. musc. II, 139 (1812), Bry. univ. ii, 440 (1827).

*Hypnum tamariscinum* C. *MUELL.* Synops. ii, 483 (1851).

*Thuidium delicatulum* *SCHIMP.* Bry. eur. Fasc. 49—51, p. 8, t. 4 (1852). Synops. 499 (1860). *BERK.* Handb. br. m. 136 (1863). *MILDE* Bry. siles. 268 (1869). *DE NOT.* Epilogo 232 (1869).

*Thuidium recognitum* *LINDB.* Not. ur. Saells. Fn. Fl. fenn. foerh. xiii, 416 (1874). *HOBK.* Synops. 2 ed. 193 (1884). *BOULAY* Musc. Fr. 156 (1884). *HUSN.* Musc. gall. 309, t. 88 (1892). *LIMPR.* in *RABENH.* D. kr. fl. Laubm. ii, 837 (1895). *DIX.* & *JAMES.* Stud. Handb. 386 (1896).

Dioicous; bipinnate, yellowish-brown, resembling *T. delicatulum* but more slender, with shorter more equal branches. Cauline leaves more crowded, widely cordate at base and plicate longitudinally, plane and serrulate at margin, suddenly narrowed into a lanceolate recurved point, the back densely covered with longer spinulose papillæ pointing forwards;

nerve strong, ending in the point. Paraphyllia lanceolate, branched, ciliate. Branch-leaves from a broadly ovate concave base, suddenly acuminate; ramuline leaves longish-pointed, nerved half way, the cells longish, the apical one lunulately truncate, crowned by 3—4 acute papillæ. Inner perich. bracts plicate, not ciliate, eroso-dentate at apex, lanceolate, gradually acuminate into a long, serrulate loriculate subula. Caps. nearly erect, cylindric, light brown, on a red-brown seta, the lid more shortly rostellate. Annulus of 3 rows of cells. Peristome as in *T. delicatulum*. Male plant small and but little branched, and frequently the male infl. is found nidulant on the female plant.

HAB.—Woods and banks in calcareous districts. Fr. very rare, 7—8.

Romantic rocks, Matlock Bath (Smith 1790, c. fr.). Helk's wood, Ingleton (Wilson 1838, c. fr.)!! Sterile plant not uncommon.

This moss is pretty generally distributed, and is often of a yellow shade, the branches are shorter and more obtuse than in *T. tamariscifolium*, from which it may easily be distinguished by the apical cell of the ramuline leaves.

Sect. 2. TETRATHAMNIUM *Mitt.* Stems ascending, pinnate, the branches arranged in two rows on each side of stem, one of each pair being anterior, and the other posterior.

#### 4. THUIDIUM ABIETINUM (L.) Br. Sch.

Dioicous; stems rigid, pinnate with attenuated branches. Leaves densely imbricated, erecto-patent, ovate-acuminate, nerved nearly to apex, cells rounded, papillose. Caps. subcylindric, cernuous. (T. LXXXV, D.)

SYN.—*Hypnum repens filicinum trichodes montanum, ramulis teretibus lutescentibus, non divisus* DILL. Cat. Giss. 218 (1718).

*Hypnum lutescens, alis subulatis tenuibus* DILL. Hist. musc. 280, t. 35, f. 17 (1741) et Herbar.

*Hypnum abietinum* L. Sp. pl. 1126 (1753), Syst. nat. ii, 704. HUDS. Fl. angl. 424 (1762). WEISS Crypt. goett. 236 (1770). NECK. Meth. musc. 163 (1771). WEB. Spic. Fl. goett. 63 (1778). WITHER. Bot. arr. ii, 685 (1776). HEDW. Stirp. cr. iv, 84, t. 32 (1797), Sp. musc. 353 (1801). RELH. Fl. cantab. Suppl. 19 (1786). ROTH Fl. germ. i, 468 (1788). SIBTH. Fl. oxon. 295 (1794). BRID. Musc. rec. II, P. II, 80 (1801), Sp. musc. II, 131 (1812), Mant. 163 (1819), Bry. univ. ii, 573 (1827). SM. Fl. brit. 1300 (1804), Eng. Bot. t. 2037. SCHULTZ Fl. starg. 317 (1806). WEB. MOHR Bot. Tasch. 332 (1807). WAHLEN. Fl. lapp. 379 (1812), Fl. carp. 358 (1814). SCHWAG. Suppl. I, P. II, 232 (1816). HOOK. TAYL. Musc. br. 104 (1818). GRAY Nat. arr. br. pl. i, 760 (1821). HUEBEN. Musc. germ. 659 (1833). DE NOT. Syllab. 15 (1838). RABENH. D. kr. fl. II. S. 3, 264 (1848). C. MUELL. Synops. ii, 482 (1851). WILS. Bry. br. 377 (1855). HOBK. Synops. 145 (1873). LESQ. JAMES Moss. N. Amer. 326 (1884).

*Thuidium abietinum* SCHIMP. Bry. eur. F. 49—51, p. 9, t. 5 (1852), Synops. 499 (1860), 2 ed. 615. BERK. Handb. br. m. 137 (1863). MILDE Bry. siles. 268 (1869). DE NOT. Epilogo 233 (1869). HOBK. Synops. 2 ed. 193 (1884). BOULAY Musc. Fr. 158 (1884). HUSN. Musc. gall. 310, t. 88 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 838 (1895). DIX. JAMES. Stud. Handb. 381 (1896).



Dioicous; in yellow-green tufts, ochraceous below; stem rigid, pinnate, simple or bipartite, sparingly radiculose, branches crowded, divergent, nearly equal. Cauline leaves crowded, cordate-ovate, acuminate and acute, deeply 4-sulcate, channelled at the slender yellow nerve which ends below the apex, margin of one wing plane, of the other reflexed, crenulate above, central basal cells rectangular. Branch-leaves imbricated, ovate acuminate, very concave, the margin irregularly denticulate, cells incrassate, roundish, strongly papillose on both sides, those on the back being longest. Paraphyllia densely crowded, forming a pale tomentum, longly lanceolate and filiform. Perichætium elongated, the inner bracts lanceolate, with slender acuminate points, sulcate, entire. Capsule suberect, cylindraceous, slightly incurved, badious, arcuate when dry; lid acuminate conic; annulus 3-seriate. Peristome orange, processes of endostome gaping in the keel, cilia 1—2. Male infl. numerous, gemmaceous, whitish.

HAB.—Bare grassy banks and sandy heaths, not common and sterile. Fr. 5—6.

Sands of Barrie, Dundee (*Arnott*)! Hayle Sands, Cornwall (*Curnow* 1861)!! Sands at Pembray. St. Andrews Links (*Howie*).

With us this species occurs most frequently near the sea, and is not so regularly pinnate as the next, though very close to it.

### 5. *THUIDIUM HYSTRICOSUM* Mitt.

Dioicous; very near *T. abietinum*, dull green, leaves unequal, longer, variously curved, uppermost subsquarrose, the cells larger, ovoid. (T. LXXXVI, A.)

SYN.—*Hypnum abietinum* p.p. DILL. L. et auct.

*Thuidium hystricosum* MITT. in SEEM. Journ. Bot. i, 356 (1863).

*Hypnum calcicola* WILSON MSS.

Dioicous; dark green, resembling *T. abietinum*, but more elegantly pinnate. Stem-leaves from a scarcely decurrent broad ovate base, lanceolate, acuminate, subsecund and slightly falcate, the uppermost larger and squarrosely spreading; the cells longer, elliptical. Branch-leaves longer, loosely appressed and variously curved, ovato-lanceolate, gradually acuminate, the point of 3 long cells; nerve ending below point, cells larger, ovoid. Fruit unknown.

HAB.—Calcareous hills.

Hinksey, Oxford (*Bobart*). Reigate hill (*Dr. Holmes*). Box hill and Morant's Court hill (*Mitten*)!! Near Basingstoke (*Brocas* 1852). Brighton (*Davies* 1868). Shere (*Dr. Capron* 1869)!! Barton Mills, Suffolk (*Borrer*). Quarry at Ingbarrow farm, Wetherby, Yorks. (*Wesley* 1877)!!

Sect. 3. *ELODIUM* Sull. Stem tall, erect, pinnate; densely tomentose, branches arranged in a single row on each side; growing in bogs.

# 6. *THUIDIUM BLANDOWII* (Web. Mohr) Schimpf.

Autoicous; stem erect, densely villose, pinnate. Leaves imbricated, subcordate, spreading at base, acute, carinate, serrulate, nerved. Capsule oblong, curved, cernuous, lid conic. (T. LXXXVI, B.)

SYN.—*Hynum Blandovii* WEBER MOHR Bot. Tasch. 332 (1807). STURM Deutsch. fl. II, 9 (1809). BRID. Sp. Musc. II, 132 (1812), Mant. 163 (1819), Bry. univ. ii, 576 (1827). ROEHL. Deutsch. fl. iii, 105 (1813). SCHWAEGL. Suppl. I, P. II, 233, et II, P. I, 158, t. 142. HOOK. TAYL. Musc. brit. 104 (1818). SCHULTZ Fl. starg. Suppl. 76 (1819). GRAY Nat. arr. br. pl. i, 760 (1821). HUEBEN. Musc. germ. 660 (1833). HOOK. Br. fl. ii, 87 (1833). RABENH. D. kr. fl. II, S. 3, 265 (1848). C. MUELL. Synops. ii, 454 (1851). WILS. Bry. br. 378 (1855). BERK. Handb. Br. m. 110 (1863). HOBK. Synops. 145 (1873). LESQ. JAMES MOSS. N. Amer. 326 (1884).

*Hynum abietinum* SWARTZ Musc. suec. 54 (1799). SM. Eng. Bot. t. 2037 (spec. c. fr.).

*Hynum affine* CROME Samml. Nachlief. 2, n. 20.

*Hynum abietinum* β. *paludosum* WAHLENB. Fl. suec. ii, 698 (1826).

*Hynum laricinum* WILS. M.S. in HOOK. Br. fl. ii, 87 (1833), Eng. Bot. t. 2760.

*Thuidium Blandowii* SCHIMP. Bry. eur. F. 49—51, p. 10, t. 6 (1852), Synops. 500 (1860), 2 ed. 616. MILDE. Bry. siles. 268 (1869). HOBK. Synops. 2 ed. 194 (1884). HUSN. Musc. gall. 310, t. 89 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 841 (1895). DIX. & JAMES. Stud. Handb. 382 (1896).

Autoicous; tall and densely caespitose, deep green above, yellowish at base. Stem pinnate, erect, 2—3-partite, densely villose with much branched pale paraphyllia; branches distichous, crowded, divergent, sub-flagelliform, flexuose. Cauline leaves large, soft, imbricated, decurrent, carinate, patent at base and subsquarrose, cordate-acuminate, with irregular longitudinal plaits, nerve thin, vanishing near apex; margin reflexed, faintly serrate, bearing long branched paraphyllia at basal angles; cells elongated rhombic, smooth in front, with long papillæ at back. Branch leaves broadly ovate-acuminate, serrate, sulcate, somewhat twisted when dry, the nerve  $\frac{3}{4}$  the length. Perich. bracts ovato-lanc. acuminate, erect, toothed at apex; seta orange. Caps. oblongo-cylindric, ferruginous, subarcuate, cernuous; lid conic, pointed, annulus broad; teeth of peristome orange, long, densely articulate, endostome yellowish, processes nearly entire, cilia 3, long and perfect. Male infl. small, bracts erecto-patent, acuminate.

HAB.—Moorland bogs, rare. Fr. 5.

Tunbridge, Kent (WOODS). Knutsford moor, Cheshire, c. fr. (Wilson 1832)!! Terrington Carr (Spruce)!! now extinct.

2. *LESKEA* Hedw.

Fund. musc. II, 93 (1782).

Primary stem creeping and bearing the fruit, vaguely branched, the ramuli single, erect from procumbent branches. Paraphyllia lanceolate or subulate. Leaves plurifarious, uniform, patent or secund, ovato-lanceolate; the cells small, mamilllose or smooth, roundish, pachydermous, chlorophyllose, the lower laxer, hexagono-rectangular. Capsule erect, oblong or cylindraceous, straight or subarcuate; calyptra pale, cucullate, endostome of 16 carinate processes, cilia short or wanting. Inhabiting trunks of trees or rocks in dull green or brownish patches.—After Professor Leske of Leipzic.

This genus is allied to *Thuidium*, but wants the beautiful pinnate arrangement of the branches seen in that genus, as well as the highly developed papillæ. About 35 species are referred to *Leskea*.

## CLAVIS TO THE SPECIES.

Without paraphyllia.

*nervosa*.

With paraphyllia.

Leaf-cells smooth, stems very slender, julaceous.

*catenulata*.

———— mamilllose, stems stronger, leaves spreading.

*polycarpa*.

Sect. I. PSEUDOLESKEA (*Br. Sch.*). Capsule short turgid, pachydermous, stems and branches filiform, creeping, in dingy green interwoven tufts.

1. *LESKEA CATENULATA* (*Brid.*) Mitt.

Dioicous; stem creeping, subpinnate with slender filiform branches. Leaves imbricated, ovate, entire, nerved to middle, the cells smooth. Capsule oblong, subcernuous; lid rostellate. (T. LXXXVI, C.)

SYN.—*Pterigynandrum catenulatum* BRID. Musc. rec. II, P. I, 64, t. 5, f. 4 (1798), Sp. musc. I, 130 (1806). ROEHL. Moosg. Deutsch. 183 (1800), Deutsch. Fl. iii, 54 (1813).

*Pterogonium catenulatum* SCHLEICH. Cat. pl. helv. 30 (1807).

*Grimmia catenulata* WEB. MOHR Bot. Tasch. 151 (1807). SCHKUHR Deutsch. moos. 64, t. 27 (1810).

*Hypnum catenulatum* SCHWÆG. Suppl. I, P. II, 218 (1816). BRID. Sp. musc. II, 154 (1812). Mant. 167 (1819), Bry. univ. ii, 450 (1827). FUNCK Deutsch. Moose t. 39, f. 16 (1821). C. MUELL. Synops. ii, 477 (1851). WILS. Bry. brit. 358, t. 55 (1855). HOBK. Synops. 153 (1873). LESQ. JAMES Moss. N. Amer. 319 (1884).

*Isoetecium catenulatum* HUEBEN. Musc. germ. 599 (1833).

*Pseudoleskea catenulata* BR. SCH. Bry. eur. fasc. 49—51, p. 3, t. 2 (1852). SCHIMP. Synops. 492 (1860), 2 ed. 604. BERK. Handb. br. m. 138 (1863). MILDE Bry. siles. 265 (1869). HOBK. Synops. 2 ed. 191 (1884). BOULAY Musc. Fr. 163 (1884). HUSN. Musc. gall. 306, t. 87 (1892). DIX. & JAMES. Stud. Handb. 380 (1896).



*Leskea catenulata* MITT. Journ. Linn. Soc. i, Suppl. 130 (1859). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 758 (1895).

*Thuidium catenulatum* DE NOT. Epil. 235 (1869).

Dioicous; densely cæspitose and interwoven, in circular fuscous-green or olivaceous tufts. Stem filiform subpinnate, rigid and brittle, branches ascending, simple and filiform, with small lanceolate paraphyllia. Leaves crowded, patent when moist, julaceously imbricated when dry, from a cordate base, lanceolate, entire, nerved to middle, recurved at margin: the cells uniform, pachydermous, forming small oval areolæ, smooth on both sides. Perich. bracts pale erect, long-pointed, with elongated cells. Capsule on a pale brown seta, cernuous, finally erect, oblong, subarcuate, yellow-brown, darker on upper surface; annulus broad, lid yellow, conico-rostellate. Teeth of peristome yellow, densely articulate, processes entire, cilia 2, half their length. Male infl. ovate, the bracts nerveless.

HAB.—Calcareous rocks and stones in subalpine districts. Fr. 6, very rare.

Ingleboro' and Penygent (*Nowell* 1856)!! Limestone wall at Middlehouses, Malham (*Nowell* 1863)!! Den of Airlie (*Lyle* 1850). Sedgwick, Westmoreland (*Stabler* 1869)! Clova mountains (*Fergusson* 1868)! Ben Lawers.

A closely allied species *L. tectorum* (BRAUN) LINDB. is found in Germany, Switzerland, and Norway.

## 2. *LESKEA NERVOSA* (*Brid.*) *Myrin.*

Dioicous; stem creeping, pinnate with erect branches. Leaves crowded, from a cordate base, ovato-lanceolate, entire, nerve lost in the point. Capsule cylindric, erect, lid obliquely rostellate. (T. LXXXVI, D.)

SYN.—*Pterigynandrum nervosum* BRID. Sp. musc. I, 132 (1806), Mant. 128 (1819), Bry. univ. ii, 189 (1827). ROEHL. Deutsch. fl. iii, 54 (1813).

*Grimmia cylindracea* WEB. MOHR Bot. Tasch. 152 (1807).

*Pterogonium nervosum* SCHWAEG. Suppl. I, P. I, 102, t. 28 (1811). FUNCK Moost. 19, t. 13 (1821).

*Leskea norvegica* SOMMERF. Suppl. Fl. Lapp. 61, t. 11 (1826).

*Maschalocarpus nervosus* SPRENG. (L.) Syst. Veg. 16 ed. iv, I, 158 (1827). WALLROTH Fl. cr. germ. i, 151 (1831).

*Anomodon nervosus* HUEB. Musc. germ. 561 (1833).

*Leskea nervosa* MYRIN Coroll. Fl. upsal. 52 (1834). SPRUCE Ann. Mag. nat. hist. 1849, I, 289. BR. SCH. Bry. eur. fasc. 44-45, p. 4, t. 3 (1850). SCHIMP. Synops. 487 (1860), 2 ed. 595. DE NOT. Epil. 245 (1869). MILDE Bry. siles. 260 (1869). HOBK. Synops. 2 ed. 189 (1884). BOULAY Musc. Fr. 167 (1884). LESQ. JAMES Moes. N. Amer. 213 (1884). HUSN. Musc. gall. 302, t. 86 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 756 (1895). DIX. JAMES. Stud. Handb. 374 (1896).

*Hypnum nervosum* C. MUELL. Synops. ii, 470 (1851).

*Leskea rupestris* BERGGR. Bidrag till Skand. Bry. 8 (1867).

*Anomodon rigidulus* KINDB. Laubm. Schwed. 11 (1883).

*Lescuræa rigidula* KINDB. Enum. n. 23 (1888).

*Leskea catenulata* Var. *rupestris* BRYHN in Norsk. Mag. naturw. xxxii (1891).

Dioicous; in dense blackish-green or brown depressed tufts. Stem creeping, pinnate, without paraphyllia; branches crowded, erect. Leaves densely crowded, patent when moist, imbricated when dry, often subsecund, from an ovato-cordate base, narrowly lanceolate, recurved at point, margin entire, recurved; nerve ending in the apex. Cells smooth, roundish-hexagonal, rectangular at base, quadrate at angles. Branch-leaves smaller with flat margins and oval cells. Inner perich. bracts suddenly and longly pointed. Capsule on a purple seta, erect, cylindric, regular, brown; lid conic, rostellate; peristome small yellowish, teeth lineal-lanc., processes of endostome irregular, cilia abortive.

HAB.—On rocks and tree-stems in mountains, very rare and sterile. Fr. 6.

Ben Lawers (Stirton 1866)!

Sect. 2. **EULESKEA** Lindb. Capsule narrow, cylindraceous, slightly arched, leptodermous; teeth whitish; plants more robust.

### 3. **LESKEA POLYCARPA** Ehr.

Autoicous; stem creeping, with erect branches, and subulate paraphyllia. Leaves dingy green, erecto-patent, ovato-lanceolate, entire, nerve vanishing below apex; cells roundish, papillose. Capsule cylindric, leptodermous. (T. LXXXVI, E.)

SYN.—*Hyponum repens trichodes arboreum medium, capitulis erectis* DILL. Cat. Giss. 216 (1718).

*Hyponum trichodes, capsulis oblongis, in setis brevioribus* DILL. Hist. musc. 331, t. 42, f. 65 (1741) et Herbar.

*Leskea polycarpa* EHRH. Dec. crypt. No. 96 (1788). ROTH Fl. germ. iii, P. I, 334 (1800). BRID. Musc. rec. II, P. II, 43, t. 1 (1801), Sp. musc. II, 74 (1812), Mant. 146 (1819), Bry. univ. ii, 314 (1827). HEDW. Sp. musc. 225 (1801). SCHULTZ Fl. starg. 509 (1806). WEB. MOHR Bot. Tasch. 247 (1807). ROEHL. Deutsch. fl. iii, 80 (1813). SCHWAEGL. Suppl. I, P. II, 171 (1816). FUNCK Moost. 54, t. 35 (1821). HUEBEN. Musc. germ. 584 (1833). DE NOT. Syllab. 65 (1838), Epilogo 244 (1869). RABENH. D. kr. fl. II, S. 3, 253 (1848). BR. SCH. Bry. eur. fasc. 44-45, p. 2, t. 1 (1850). WILS. Bry. brit. 332 (1855). SCHIMP. Synops. 486 (1860), 2 ed. 594. BERK. Handb. br. m. 153 (1863). MILDE Bry. siles. 259 (1869). HOBK. Synops. 144 (1873). BOULAY Musc. Fr. 168 (1884). LESQ. JAMES Moss. N. Amer. 301 (1884). HUSN. Musc. gall. 301, t. 85 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 762 (1895). DIX. JAMES. Stud. Handb. 373 (1896).

*Hyponum medium* DICKS. Crypt. fasc. II, 12 (1790). WITHER. Bot. arr. 3 ed. iii, 847 (1796). TURN. Musc. hib. 142 (1804). SM. Fl. brit. iii, 1280 (1804), Eng. Bot. t. 1274. HOOK. TAYL. Musc. brit. 93 (1818). GRAY Nat. arr. i, 753 (1821).

*Hyponum polycarpum* HOFFM. Deutsch. fl. ii, 67 (1796). DICKS. Fasc. crypt. II, 12 (1790). C. MUELL. Synops. ii, 469 (1851).

Autoicous; in wide soft dingy green tufts. Stem trailing, with erect branches and short filiform paraphyllia. Leaves erecto-patent

when moist, appressed when dry, sometimes subsecund, from a cordate-ovate base, gradually lanceolate, concave, biplicate, entire, the margin recurved below; nerve vanishing below apex. Cells hyaline, leptodermous, roundish-hexagonal, quadrate at base, papillose on both sides. Perich. bracts sheathing, elongated at points and the cells elongated. Capsule on a red seta, erect, cylindraceous, slightly arcuate, much contracted below the orange mouth when dry, leptodermous, yellowish-brown; lid pointed, conical, annulus of 2—3 rows of cells. Peristome yellowish-white, strongly incurved, the teeth lineal; processes of endostome lineal-subulate, cilia wanting. Male infl. gemmiform, bracts broadly oval, short, obtuse.

HAB.—About tree roots in damp places by streams. Fr. 5—6.

Var. *β. paludosa* (Hedw.) Schimpf.

More robust, with longer obtuse branches, leaves larger, less crowded, patulous. Capsule longer, reddish-brown.

SYN.—*Leskea paludosa* HEDW. Musc. frond. iv, 1, t. 1 (1793), Fl. danica t. 1662. BRID. Sp. musc. II, 15, Mant. 147, Bry. univ. ii, 315. WEB. MOHR Bot. Tasch. 246. SCHWAEGL. Suppl. I, P. II, 172. ROEHL. Deutsch. fl. iii, 85.

*Hypnum palustre* HOFFM. Deutsch. fl. ii, 64.

*Hypnum inundatum* DICKS. Crypt. fasc. IV, 17. SM. Fl. brit. iii, 1281, Eng. Bot. t. 1922. TURN. Musc. hib. 143.

*Hypnum paludosum* P. BEAUV. Prodr. 67.

*Leskea palustris* BRID. Musc. rec. II, P. II, 38.

*Leskea polycarpa* Var *β. paludosa* SCHIMP. Synops. 486.

HAB.—On tree roots liable to inundation; the variety where moisture is more permanent.

From the nature of the locality it is seldom that clean specimens can be obtained, a coat of fine mud being usually deposited upon them.

### 3. ANOMODON Hook. Tayl.

Musc. brit. 79 (1818).

Primary stem creeping stoloniform, with small leaves; secondary stems erect or ascending, with few irregular ramuli, without paraphyllia. Leaves opaque, crowded, patent or subsecund, minutely areolate, papillose on both sides. Fruit on the secondary stems; capsule oblong or cylindraceous, regular, coriaceous, not contracted below the mouth. Annulus narrow or none. Calyptra cucullate. Peristome of 16 teeth, pale, lineal-lanceolate, without lamellæ, or yellowish with faint lamellæ;



endostome with a short carinate basal membrane and short filiform processes, with rudimentary cilia. Growing on shady ground, rocks and trunks of trees.—Der. *avopos* irregular, and *oδovs* a tooth.

A genus of some 30 species, six of which are found in Europe. The main stem is stoloniform with erect secondary stems with few branches, or depressed and much branched and flagelliferous.

## CLAVIS TO THE SPECIES.

Leaves tongue-shaped obtuse.

Robust, little-branched; leaves entire.

Slender, much-branched; leaves serrulate at point.

—— ovato-lanceolate, acuminate.

*viticulosus*.

*attenuatus*.

*longifolius*.

1. *ANOMODON VITICULOSUS* (L.) Hook. Tayl.

Dioicous; robust, with erect secondary stems. Leaves spreading, subsecund, ovato-lingulate, obtuse, entire; nerve whitish, vanishing below apex. Capsule erect, subcylindric, lid conico-rostellate. (T. LXXXVII, A.)

SYN.—*Hypnum repens trichodes arboreum majus, capitulis et surculis erectis, minus ramosis* DILL. Cat. Giss. 216 (1718).

*Hypnum subhirsutum, viticulis gracilibus erectis, capsulis teretibus* DILL. Hist. musc. 307, t. 39, f. 43 (1741) et Herbar.

*Hypnum viticulosum* L. Sp. pl. 1127 (1753), Syst. nat. ii, 704. HUDS. Fl. angl. 425 (1762). WEISS Crypt. goett. 241 (1770). SCHREB. Spic. Fl. Lips. 94 (1771). NECK. Meth. musc. 169 (1771). WITH. Bot. arr. ii, 686 (1776). LIGHTF. Fl. scot. ii, 754 (1777), Eng. Bot. t. 265. RELH. Fl. cant. 412 (1785). HOFFM. Deuts. Fl. ii, 47 (1796). C. MUELL. Synops. ii, 472 (1851).

*Neckera viticulosa* HEDW. Fund. II, 93 (1782), Sp. musc. 209, t. 48 (1801). SIBTH. Fl. oxon. 304 (1794). SWARTZ Musc. succ. 71 (1799). BRID. Musc. rec. II, P. II, 15 (1801), Sp. musc. II, 37 (1812), Mant. 138 (1819), Bry. univ. ii, 231 (1827). SM. Fl. brit. 1275 (1804). TURN. Musc. hib. 103 (1804). SCHULTZ Fl. starg. 307 (1806). WEB. MOHR Bot. Tasch. 240 (1807). VOIT Musc. herb. 69 (1812). ROEHL. Deutsch. fl. iii, 83 (1813). WAHLEN. Fl. carpat. 355 (1814). SCHWAEGL. Suppl. I, P. II, 149 (1816). MART. Fl. cr. erl. 51 (1817).

*Anomodon viticulosus* HOOK. TAYL. Musc. br. 79, t. 22 (1818). GRAY Nat. arr. br. pl. i, 748 (1821). HOOK. Fl. scot. II, 138 (1821). SPRENG. (L.) Syst. Veg. 16 ed. iv, 186 (1827). HUEBEN, Musc. germ. 564 (1833). DE NOT. Syllab. 73 (1838), Epilogo 250 (1869). RABENH. D. kr. fl. ii, 3, p. 250 (1848). BR. SCH. Bry. eur. fasc. 44—45, t. 3 (1850). WILS. Bry. brit. 318, t. 22 (1855). SCHIMP. Synops. 490 (1860), 2 ed. 601. BERK. Handb. br. m. 151, t. 13 (1863). MILDE Bry. siles. 262 (1869). HOBK. Synops. 140 (1873). LESQ. JAMES MOSS. N. Amer. 306 (1884). HUSN. Musc. gall. 304, t. 86 (1892). LIMPR. in Raben. D. kr. fl. Laubm. ii, 772 (1895). DIX. JAMES. Stud. Handb. 375 (1896).

*Leskea viticulosa* SPRUCE Ann. Mag. Nat. hist. 2 ser. iii, 289 (1849). BOULAY Musc. Fr. 164 (1884).

Dioicous; robust in dense-leaved rigid tufts, deep green or yellow-green above, ochraceous below. Primary stem elongated, creeping simple, with small leaves, secondary erect or geniculate-ascending, simple or with a few innovations, stoloniferous at base. Leaves secund

or falcato-second, crispate when dry, spreading when moist, ovato- and oblongo-lanceolate, tongue-shaped, obtuse, lightly undulate and entire at margin, sometimes erose at apex, very densely areolate and obscure with minute roundish-hexagonal cells, minutely papillose, those at middle of leaf base elongated and rectangular; nerve strong, whitish, vanishing below apex. Inner perich. bracts from an elongate base, linear, nerved; seta long, yellowish-brown. Capsule erect or inclined, cylindraceous, straight or a little curved, glossy rufo-ferruginous, longitudinally plicate when empty; lid narrowly conic, obliquely rostellate; annulus narrow, of 2 rows of cells. Peristome small, whitish, teeth narrow, lanceolate, without lamellæ, often irregular; endostome with a narrow basal membrane, the processes filiform, fragile and irregular. Male infl. ovate, the bracts nerved.

HAB.—Stony ground in calcareous districts, by shady walls and trunks of trees; common. Fr. 3—4, rare.

The fruit is most frequently produced in damp, shady places, as near the base of walls and in damp woods. The white, translucent nerve is generally somewhat flexuose below the apex, and is a marked feature in the leaf.

## 2. *ANOMODON ATTENUATUS* (Schreb.) Hueben.

Dioicous; slender, with much branched secondary stems. Leaves subsecund, broadly ovato-lanceolate, with a minute apiculus and a few apical teeth. Capsule erect, cylindric, lid rostrate. (T. LXXXVII, B.)

SYN.—*Hypnum repens filicinum ramosum, ramulis surrectis et minus complanatis* DILL. Cat. Giss. 218 (1718).

*Hypnum arboreum erectum, fruticuli specie, ramulis compressis* DILL. op. c. 220.

*Hypnum filicinum sericeum, molle et pallidum, mucronibus aduncis.* Var. *non splendens* DILL. Hist. musc. 287, t. 36, f. 22 C (1741), et Herbar.

*Hypnum heterophyllum aquaticum, polycephalum, repens.* Var. *rigidior et ramosior* DILL. op. c. 293, t. 37, f. 27 B. et Herbar.

*Hypnum attenuatum* SCHREB. Fl. lips. 100 (1771). HOFFM. Deutsch. fl. ii, 67 (1796). C. MUELL. Synops. ii, 473 (1851).

*Leskea attenuata* HEDW. Musc. frond. i, 33, t. 12 (1787), Sp. musc. 230 (1801). ROTH. Fl. germ. iii, P. I, 333 (1800). BRID. musc. rec. II, P. II, 39, t. 3 (1801), Sp. musc. II, 76 (1812), Mant. 147 (1819), Bry. univ. ii, 317 (1827). SCHULTZ. Fl. starg. 311 (1806). WEB. MOHR Bot. Tasch. 249 (1807). ROEHL. Deutsch. fl. iii, 87 (1813). SCHWAEGL. Suppl. I, P. II, 172 (1816). DE NOT. Syllab. 65 (1838). BOULAY Musc. Fr. 165 (1884).

*Anomodon attenuatus* HUEBEN. Musc. germ. 562 (1833). RABENH. D. kr. fl. ii, S. 3, 255 (1848). BR. SCH. Bry. eur. fasc. 44—45, t. 2 (1850). SCHIMP. Synops. 490 (1860), 2 ed. 600. MILDE Bry. siles. 262 (1869). DE NOT. Epilogo 250 (1869). HOBK. Synops. 140 (1873). HUSN. Musc. gall. 304, t. 86 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 774 (1895). DRX. JAMES. Stud. Handb. 375 (1896).

*Neckera attenuata* MYRIN Coroll. fl. upsal. (1834).

Dioicous; in loose yellowish-green tufts. Main stem trailing, with rufous radicles; secondary stems erect, incurved at apex, fasciculate-branched, with slender stolons and flagella. Leaves subsecund, decurrent at base, broadly ovato-lanceolate and tongue-shaped, muticous or with a minute apiculus and a few coarse teeth at apex; nerve ending below the point, cells very densely papillose on both sides, elongated rectangular in middle of base. Perich. bracts acuminate, patent from the middle. Capsule cylindric, ferruginous, exannulate, elevated above the branches, lid with a long beak; teeth lanceolate-subulate, processes of endostome filiform, long as the teeth, with cilia.

HAB.—Rotten trunks of trees and by paths in woods; very rare, sterile.

Den of Airlie, Forfarshire (*Fergusson* 1868)!! Ben Lawers.

A much smaller and more delicate plant than *A. viticulosus* and of a paler colour. The fruit has been found most frequently in S. Germany and E. Switzerland.

### 3. *ANOMODON LONGIFOLIUS* (*Schleich.*) *Hartm.*

Dioicous; in slender dark green tufts, irregularly branched. Leaves ovato-lanceolate, acuminate, entire, nerved to apex. Capsule erect, oblong; lid conic, rostellate. (T. LXXXVII, C.)

SYN.—*Hypnum repens trichodes arboreum majus, cauliculis ramosis* DILL. Hist. musc. 331, t. 42, f. 66 (1741) et Herb.

*Hypnum attenuatum* SM. Fl. brit. 1279 (1804).

*Pterigynandrum longifolium* (SCHLEICH.) Catal. (1807), et crypt. helv. cent. iv, n. 8. BRID. Mant. 128 (1819).

*Pterigynandrum nervosum* var. *longifolium* BRID. Bry. univ. ii, 190 (1827).

*Leskea incurvata* MYRIN Coroll. Fl. Upsal. (1834).

*Leskea longifolia* SPRUCE Musc. Pyren. No 87 (1847), et Ann. Mag. Nat. hist. 1849, I, 289. RABENH. D. kr. fl. II, S. 3, 255 (1848). BOUL. Musc. Fr. 166 (1884).

*Anomodon longifolius* HARTM. Skand. fl. 5 ed. (1849). BR. SCH. Bry. eur. fasc. 44—45, p. 3, t. 1 (1850). WILS. Bry. brit. 319, t. 54 (1855). SCHIMP. Synops. 489 (1860), 2 ed. 599. BERK. Handb. br. m. 152 (1863). MILDE Bry. siles. 261 (1869). HOBK. Synops. 141 (1873). HUSN. Musc. gall. 303, t. 86 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 776 (1895). DIX. JAMES. Stud. Handb. 375 (1896).

*Hypnum longifolium* C. MUELL. Synops. ii, 474 (1851).

Dioicous; slender, laxly tufted, deep green. Secondary stems erect, long, often filiform, vaguely and fasciculate-branched, branches slender, often becoming flagelliform with small leaves. Leaves flexuosopatulous and subsecund, from an ovate base, lineal-lanceolate, acute, entire, bisulcate at base, nerve yellow, vanishing in apex; cells roundish-



hexagonal, papillose on both sides, yellow and longish in the middle of base. Perich. bracts pale, the inner narrowed into a long flexuose subula, thin-nerved. Capsule on a slender yellow seta, scarce reaching above the branches, small, erect, oblongo-cylindraceous, exannulate, ferruginous; lid conico-rostellate; teeth lineal-lanceolate, yellow, papillose, inner processes short, filiform.

HAB.—Stony ground and at tree roots; rare and sterile. Fr. 11—3, very rare.

Ben Lawers (*Greville*). Den of Airlie (*Gardiner*). Near Wells, Somerset (*Binstead* 1887)!!  
Egglestone Abbey (*Baker*).

Subf. 2. HYPNÆ. Plants nearly simple, or branched irregularly, pinnate or dendroid; creeping, procumbent, ascending or erect, densely or loosely matted. Leaves in many rows, divergent or squarrose, or secund, often falcate, with a single nerve, rarely nerveless, smooth and glossy or rarely with small papillæ, usually denticulate at margin. Cells prosenchymatous, often very narrow, linear and vermicular, quadrate and often enlarged or coloured at basal angles. Capsule incurved, cernuous or horizontal, rarely erect and regular; endostome with 16 processes, usually with cilia interposed.

#### 4. AMBLYSTEGIUM Br. Sch.

Bryol. eur. Fasc. 55—56 (1853).

Plants small, slender with creeping prostrate stems, or robust and taller, ascending or in erect tufts, pinnately branched, and often with paraphyllia. Leaves equal, in 5—8 rows, spreading or falcato-secund, ovate or cordate, the cells minute elliptic and incrassate or elongato-hexagonal or very narrow and linear, those at basal angles parenchymatous often large and inflated. Capsule on a long smooth seta, oblong, inclined, cernuous or rarely erect, leptodermous, lid conic, mucronate; peristome of 16 teeth, lanceolate, yellowish; endostome tubular below, with 16 lanceolate processes cleft in mid-line, cilia 2—3, very rarely obsolete; calyptra narrow and cucullate. Inhabiting wet ground, or rocks or bogs.—Der. *αμβλυσ* blunt, *στέγη* a lid.

Several apparently distinct groups are brought together under this genus, which with respect to the first section appears natural enough, but when we come to *A. riparium* we pass at once to other forms which glide into each other so gradually that it is impossible to define them as genera. I have therefore followed De Notaris, Mitten and Lindberg in also placing under *Amblystegium* several groups of marsh Hypnoms, each of which has some

common habit or character, but yet not sufficiently important to supply a foundation for genera.

The sections of the genus are—

1. EUAMBLYSTEGIUM *Lindb.* chiefly represented by the small species of which *A. serpens* may be taken as the type.
2. CAMPYLIADELPHUS *Lindb.* principally grouped round *A. stellatum* and resembling *Campylium Halleri* in habit.
3. DREPANOCLADUS *C. Muell.* The difficult group afterwards named by Sullivant *Harpidium*, to which *Hypnum aduncum* and a number of species with falcato-secund leaves belong.
4. SCORPIDIUM *Schimp.* *H. scorpioides*.
5. HYGROHYPNUM *Lindb.* Superseding *Limnobium* SCHIMP., a name already in use for a genus of flowering plants of the family Hydrocharidaceæ. *H. palustre* is the type of this group.
6. CALLIERGON *Sulliv.* Represented by *H. cordifolium* and *stramineum*.

Sect. 1. EUAMBLYSTEGIUM *Lindb.* Stems creeping, much and irregularly branched. Leaves erecto-patent, ovato-lanceolate, cells ovoid or elongato-rhomboidal. Capsule oblong or cylindric, curved.

#### CLAVIS TO THE SPECIES.

Plants very small and slender, leaves nerveless.	
Dioicous, capsule suberect.	<i>Sprucei.</i>
Autoicous, capsule horizontal.	<i>confervoides.</i>
Plants larger, leaves nerved.	
Nerve excurrent.	<i>fallax.</i>
— reaching apex.	
Stem densely coated with radicles and paraphyllia.	<i>filicinum.</i>
Stem without radicles and paraphyllia.	
Leaves auricled, acuminate.	<i>irriguum.</i>
— not auricled, somewhat obtuse.	<i>fluviatile.</i>
— vanishing just below apex.	
Leaves broadly ovate, with a short acumen.	<i>curvicaule.</i>
— oval-lanceolate, gradually acuminate.	<i>varium.</i>
— reaching middle of leaf.	
Plants slender, leaf-cells short.	
Leaves patent, ovate, longly acuminate.	<i>radicale.</i>
—, deltoid-ovate, longly acuminate, with larger cells.	<i>Furatzka.</i>
— ascending, shortly acuminate.	<i>serpens.</i>
— robust, leaf-cells longer.	
Leaves broadly oval, cells 5—8 times long as broad.	<i>trichopodium.</i>
— oblong-lanc., cells 12—15 ———.	<i>riparium.</i>

#### 1. AMBLYSTEGIUM FILICINUM (L.) De Not.

Dioicous; stem pinnate, 2—4 in. high, radiculose. Leaves ovato-lanceolate, falcato-secund, serrulate, nerved to apex. Caps. oblong, cernuous, lid conical. (T. LXXXVII, D.)

SYN.—*Hypnum repens filicinum, trichodes palustre* DILL. Cat. Giss. 218 (1719), et in RAY Synops. 3 ed. 85, n. 31 (1724), Hist. musc. 286, t. 36, f. 21 (1741) et Herbar.

*Hypnum filicinum* L. Sp. pl. 1125 (1753). HUDS. Fl. angl. 422 (1762). NECK. Meth. musc. 164 (1771). WITHER. Bot. arr. Br. veg. ii, 684 (1776). LIGHTF. Fl. scot. ii, 748 (1777). WEB. Spic. fl. goett. 56 (1778). RELH. Fl. cant. 410 (1785). ROTH. Tent. fl. germ. i, 467 (1788). SIBTH. Fl. oxon. 294 (1794). ABBOT Fl. Bedf. 247 (1798). SWARTZ Musc. succ. 55 (1799). HEDW. Sp. musc. 285 T. 76, f. 7—10 (1801). SMITH Fl. brit. 1334 (1804), Eng. Bot. t. 1570. TURN. Musc. hib. 197 (1804). BRID. Sp. Musc. II, 210 (1812), Mant. 177 (1819), Bry. univ. ii, 527 (1827). ROEHL. Deutsch. Fl. iii, 114 (1813). SCHWAG. Suppl. I, P. II, 297 (1816). MART. Fl. cr. erl. 35 (1817). HOOK. TAYL. Musc. brit. 109 (1818). GRAY Nat. arr. br. pl. i, 764 (1821). HOOK. Fl. scot. P. 2, 147 (1821), Br. fl. ii, 92 (1833). HUEBEN. Musc. germ. 689 (1833). DE NOT. Syllab. 52 (1838). RABENH. D. kr. fl. II, S. 3, 277 (1848). C. MUELL. Synops. ii, 419 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 40, T. 27 (1854). WILS. Bry. brit. 392 (1855). SCHIMP. Synops. 614 (1860), 2 ed. 740. BERK. Handb. Br. m. 121, t. 10, f. 6 (1863). HOBK. Synops. 170 (1873). BOUL. Musc. France 48 (1884). LESQ. JAMES MOSS. N. Amer. 386 (1884).

*Hypnum dubium* NECK. Meth. musc. 161 (1771). DICKS. Crypt. Fasc. III, 10 (1793). WITHER. 3 ed. iii, 854 (1796). SM. Fl. brit. 1332. Eng. Bot. t. 2126. TURN. Musc. hib. 195.

*Hypnum affine* and *H. extricatum* HOFFM. Deutsch. fl. ii, 61 (1795).

*Hypnum compressum* BRID. Musc. rec. II, P. II, 58 (1801).

*Amblystegium filicinum* DE NOT. Epilogo 150 (1860). MILDE Bry. siles. 325 (1869). HUSN. Musc. gall. 361, t. 103 (1893). DIX. JAMES. Stud. Handb. 445 (1896).

Dioicous; prostrate or ascending, bright green or with a golden yellow tint. Stem rigid, pinnate, densely tomentose, and with a few short lanceolate paraphyllia. Cauline leaves from a dilated base, with large impressed auricles and lax pellucid rectangular cells, hastato-acuminate, patent, falcate, the upper cells short and pachydermous; margin erect, serrulate; nerve strong, yellow, continued to apex. Perich. bracts lanceolate, acuminate, subplicate, serrate at apex, with lax cells and thin nerve. Capsule oblong or cylindric, subarcuate, cernuous, lid convex-conic, apiculate; teeth lineal-subulate, yellow, processes nearly entire with 2—3 long slender cilia.

HAB.—Wet banks and about springs, especially on limestone, common. Fr. 4—5.

Var. *β. trichodes* Brid.

Stem prostrate, pinnate, branches slender, incurved, acute. Leaves small, patent or secund.

SYN.—*Hypnum trichodes* BRID. Sp. musc. II, 236 (1812).

*Hyp. filicinum β. trichodes* BRID. Bry. univ. ii, 529.

*Hyp. filicinum* Var. *gracilescens* SCHIMP. Synops. 614.

HAB.—Wet grassy ditches. Malham (*Wesley*)! Langdon Beck, Upper Teesdale (*R. Barnes* 1886)!!

Var. *γ. elatum*. Schimp.



In tall soft brown tufts. Stems very slender, erect, 4—6 in. high, with hardly any radicles or paraphyllia, interruptedly pinnato-ramulose. Leaves narrowly ovato-lanceolate with long subulate points, patent or subsecund.

SYN.—*Hyphnum filicinum* Var. *elatum* SCHIMP. Synops. 2 ed. 740.

HAB.—In spongy bogs. Southport (*Holt* 1882)!!

Several other varieties have been named, but they seem rather forms due to local conditions or season. The species may be distinguished from *A. glaucum* by the leaves being smaller and not flexuose when dry, with a stronger nerve and much shorter cells.

## 2. *AMBLYSTEGIUM FALLAX* (*Brid.*) *Milde.*

Dioicous; stem elongated with few branches or paraphyllia, and scarcely any radicles. Leaves erect, broadly ovato-lanceolate, with a thick excurrent nerve, the basal angular cells lax and quadrate. (T. LXXXVIII, A.)

SYN.—*Hyphnum fallax* BRID. Musc. rec. II, P. II, 66, t. 2, f. 1 (1801), Sp. musc. II, 235 (1812), Mant. 181 (1819). P. BEAUV. Prodr. 63 (1805). WEB. MOHR. Bot. Tasch. 304 (1807). Eng. Bot. t. 2127. ROEHL. Deutsch. fl. iii, 110 (1813). SCHULTZ Suppl. Fl. Starg. 78 (1819). LIMPR. Krypt. Fl. Schlesien (1877).

*Hyphnum Vallis-clausæ* BRID. Sp. musc. II, 238 (1812), Mant. 182 (1819), Bry. univ. ii, 534 (1827).

*Hyphnum filicinum* var. *fallax* HOOK. TAYL. Musc. br. 109 (1818). BRID. Bry. univ. ii, 531. HUEBEN. Musc. germ. 690 (1833). BOULAY Musc. de Fr. 50 (1884).

*Hyphnum filicinum*  $\beta$ . *vallis clausæ* WILS. Bry. brit. 393.

*Amblystegium irriguum*  $\gamma$ . *fallax* SCHIMP. Synops. 594 (1860). DE NOT. Epilogo 153 (1869).

*Amblystegium fallax* MILDE Bry. siles. 325 (1869).

*Ambl. irriguum* var. *spinifolium* SCHIMP. Synops. 2 ed. 713 (1876).

*Ambl. Vallis-clausæ* HUSN. Musc. gal. 361, t. 103 (1893).

Dioicous; in wide-spreading, somewhat glossy, dark green tufts. Stems elongated, flexuose and suberect, with hardly any radicles, and very few paraphyllia, pinnate with short ascending branches, the lower part beset with the nerves of decayed leaves. Leaves crowded, stiff, erect, ovato-lanceolate, uppermost subsecund, margin faintly serrulate, at base decurrent, with large, very lax quadrate cells, nerve thick, excurrent in a spiniform point. Capsule cylindric, arcuate.

HAB.—In streams and springs, not common. Fr. 4—5.

Ormshead (*Wilson* 1828) ! In the Wharfe, Bolton Abbey (*Baker* 1858) ! Duneton, Sussex (*Fenner*) ! Buxton (*Hunt* 1871) ! Sapperton, Stroud, Gloucester (*G. Holmes* 1895) ! Chee Tor and Monsal dale (*Holt* 1880) !

This moss differs so much in habit from *A. filicinum* that I think it worthy to rank again as a species. The direction of the leaves, with their very strong excurrent nerve, and different formation of the base, combined with the almost total absence of paraphyllia afford strong distinctive characters. It bears much resemblance to *A. fluviatile* and grows in similar localities.

### 3. *AMBLYSTEGIUM CURVICAULE* (Juratz.) Dixon.

Dioicous; stem with few branches or nearly simple. Leaves erecto-patent, broadly oval, suddenly acuminate, auricled at base, nerved to base of acumen. (T. LXXXVIII, B.)

SYN.—*Hyponum curvicaule* JURATZ. Verhandl. zool.-bot. Ges. Wien xiv, 103 (1864). SCHIMP. Synops. 2 ed. 806 (1876). VENTURI in Rev. bryol. 1881, p. 82. HUSN. Musc. gall. 427, t. 124 (1894).

*Amblystegium filicinum* \* *curvicaule* LINDB. Musc. scand. 32 (1879).

*Amblystegium curvicaule* DIX. JAMES. Stud. Handb. 447 (1896).

Dioicous; in yellowish-green tufts, fuscous at base, stems ascending, flexuose, with very few radicles, ramulose or nearly simple, curved at apex, nearly naked and very slender at base. Leaves erecto-patent, glossy, laxly imbricated when dry, the uppermost subsecund, cauline broadly ovate, suddenly shortly acuminate, plano-concave, with a slight fold on each side the flat nerve, which vanishes at base of acumen, or between that and the middle of leaf; base auricled, the cells at angles yellowish, oblongo-rectangular, upper 4 times as long as broad; branch leaves narrower with a longer acumen, margins very minutely serrulate, upper cells rhombic and trapezoid, basal yellow; a few small circular and lanceolate paraphyllia are found near the base of the branches.

HAB.—Mountain rocks, very rare.

Ben Lawers at 3500 ft. (*H. N. Dixon* July, 1893)!!

Var. *β. strictum* Dixon.

Stem and branches prostrate, rigid; branches straight, cuspidate. Leaves narrower, oblong-lanceolate, not plicate, cells elliptic-hexagonal, narrower, 6—8 times as long as wide.

HAB.—Ben Lawers with the type (*H. N. Dixon*).

This interesting moss was first found in the Austrian Tyrol, and since in Switzerland, Styria, Norway, Lapland, &c., but always sterile. It is undoubtedly allied to *A. filicinum*, but has a distinct facies and different habit by which it may always be separated.

4. **AMBLYSTEGIUM IRRIGUUM** (Wils.) Schimp.

Autoicous; prostrate, more or less pinnate, deep green. Leaves patent and subsecund, ovato-lanceolate, acuminate, obsoletely serrulate, nerved to apex, basal cells dilated. Capsule oblong, cernuous, arcuate. (T. LXXXVIII, C.)

SYN.—*Hypnum fluviatile* p.p. plur. auct. (non SWARTZ).

*Amblystegium fluviatile* BR. SCH. Bry. eur. fasc. 55—56, p. 11, t. 5 (1853).

*Hypnum irriguum* WILS. Bry. brit. 361 (1855). BERK. Handb. br. m. 97 (1863). HOBK. Synops. 164 (1873). BOUL. Musc. Fr. 72 (1884).

*Amblystegium irriguum* SCHIMP. Coroll. Bry. eur. 127 (1855), Synops. 594 (1860), 2 ed. 712. MILDE Bry. siles. 326 (1869). DE NOT. Epilogo 152 (1869). HOBK. Synops. 2 ed. 213 (1884). LESQ. JAMES MOSS. N. Amer. 374 (1884). HUSN. Musc. gall. 360, t. 103 (1893). DIX. JAMES. Stud. Handb. 444 (1896).

Autoicous; cæspitose, depressed, rigid, deep green. Stem rooting in all its length, subpinnato-ramulose. Leaves subremote, erecto-patent and subsecund, opaque, from a cordate or broadly ovate decurrent base, lanceolate, longly and acutely acuminate, obsoletely serrulate, nerve flattened, vanishing in the apex, basal cells quadrate and rectangular, diminishing gradually upward, the upper cells hexagonal. Inner perich. bracts oblong-lanceolate, entire; capsule incurv-cernuous, oblong, leptodermous, arcuate when dry, contracted below the dilated mouth, pale ferruginous; lid convex-conic, apiculate; annulus of 3 rows of cells; teeth rather broad, orange, processes nearly entire, cilia 2—3 long.

HAB.—Sandstone rocks and stones in streams, not uncommon. Fr. 5.

Felyn Esgob near Bangor and Hill Cliff, Dingle (Wilson 1854)!! Sussex (Borrer). Tyfry, Anglesey (Wilson 1854)!! Windermere (Clowes 1856)! Ashley Mill, Cheshire (Hunt 1865)!! Shere, Surrey (Capron 1868)!! Kirkham weir, Yorks. (Hunt 1871).

5. **AMBLYSTEGIUM FLUVIATILE** (Swartz) Schimp.

Autoicous; prostrate, with flaccid simple branches. Leaves ascending, laxly imbricated, ovate, concave, rather obtuse, entire, nerved nearly to apex. Capsule suberect, cylindric, somewhat curved, lid conical. (T. LXXXVIII, D.)

SYN.—*Hypnum fluviatile* SWARTZ Musc. succ. 63 (1799). HEDW. Sp. musc. 277, t. 81 (1801). WEB. MOHR Bot. Tasch. 303 (1807). HARTM. Skand. Fl. 5 ed. 333 (1849). WILS. Bry. brit. 359, t. 55 (1855). BERK. Handb. Br. m. 98 (1863). HOBK. Synops. 164 (1873).

*Hypnum fulustre*  $\beta$ . *fluviatile* WAHLEN. Fl. succ. 2 ed. 732 (1833). MYRIN Coroll. 38.



*Amblystegium fluviatile* SCHIMP. Bry. eur. fasc. 62—64 (1854), Synops. 594 (1860), 2 ed. 713. MILDE Bry. siles. 326 (1869). HARTM. Skand. fl. 10 ed. (1871). HOBK. Synops. 2 ed. 213 (1884). HUSN. Musc. gall. 360, t. 103 (1893). DIX. JAMES. Stud. Handb. 445 (1896).

*Hypnum irriguum* \* *fluviatile* BOUL. Musc. Fr. 73 (1884).

Autoicous; in flat soft blackish-green tufts. Stem sparingly radiculose, elongated, prostrate, ascending at apex, the base denuded by decay of leaves; branches remote, not pointed, long and suberect. Leaves more or less remote, crowded, subimbricated or subsecund, ovato- and oblongo-lanceolate, somewhat obtuse, scarce decurrent, not excavated at angles, concave at base, margin recurved quite entire; nerve strong, lost at apex; cells at base rather lax, all equal. Perich. bracts erect, costate, seta smooth, reddish; capsule longish, arcuato-cylindraceous, yellow-ferruginous; lid conical, acute.

HAB.—Rocks and stones in subalpine streams. Fr. 5—6.

River Cegin, Bangor (Wilson 1831)!! Pentland hills (Greville 1842)! Matlock (Teesdale). Bolton Abbey (Hunt). Burn of Sorrow near Dollar (Kidston 1885)!! Dupplin, Perth (Meldrum 1892)! Berryhill well, Murrayshall, Stirling (Kidston 1893)!! Winston Bridge, Teesdale and West Stonesdale beck, Upper Swaledale (R. Barnes 1888)!!

These two species are closely allied but yet possess a quite distinct habit; *A. irriguum* is a rigid plant, much more branched and interwoven, with acute leaves more or less obsoletely serrulate; *A. fluviatile* is softer, with nearly simple stems and few branches, the leaves more or less obtuse at point and with entire margins; the capsule also is longer.

## 6. AMBLYSTEGIUM VARIUM (Hedw.) Lindb.

Autoicous; laxly tufted, deep green. Leaves oval-lanceolate, acuminate, entire, nerved to apex. Capsule cylindric, arcuate, lid conical. (T. LXXXVIII, F.)

SYN.—*Leskea varia* HEDW. Sp. musc. 216, t. 53, f. 15—20 (1801). BRID. Sp. musc. II, 71 (1812), Mant. 146 (1819). SCHWÆG. Suppl. I, P. II, 174 (1816).

*Hypnum varium* P. BEAUV. Prodr. 72 (1805).

*Hypnum Stereodon varius* BRID. Bry. univ. ii, 652 (1827).

*Hypnum orthocladon* P. BEAUV. Prodr. 67. BRID. Sp. musc. II, 241, Mant. 182, Bry. univ. ii, 537. SCHWÆG. Suppl. I, P. II, 262. SULLIV. Icon. musc. 199, t. 122 (1864). LESQ. JAMES Moss. N. Amer. 374 (1884).

*Hypnum debile* BRID. Sp. musc. II, 250.

*Hypnum serpens* β. *varium* C. MUELL. Synops. ii, 412 (1851).

*Amblystegium radicale* BR. SCH. Bry. eur. fasc. 55—56, p. 8, t. 4 (1853). SCHIMP. Synops. 592 (1860), 2 ed. 711. MILDE Bry. siles. 324 (1869). DE NOT. Epilogo 154 (1869). HOBK. Synops. 2 ed. 213 (1884).

*Hypnum radicale* (non P. B.) WILS. Bry. brit. 363, t. 25 (1855). BERK. Handb. br. m. 97 (1863). HOBK. Synops. 164 (1873). BOULAY Musc. France 73 (1884). LESQ. JAMES Moss. N. Amer. 373 (1884).

*Stereodon varius* MITT. Journ. Linn. Soc. viii, 43 (1864).

*Amblystegium varium* LINDB. Musc. scand. 32 (1879). HUSN. Musc. gall. 359, t. 103 (1893). DIXON JAMES. Stud. Handb. 443 (1896).

Autoicous; laxly tufted, deep green, rigid, prostrate. Stems densely radiculose and ramulose, the shorter branches erect. Leaves firm, from a broadly ovate or obcordate base, narrowly lanceolate, longly acuminate, entire, erecto-patent, nerve strong, continued into apex; cells dense, sub-hexagonal, those at basal angles quadrato-rectangular. Perich. bracts oblong, thin, plicate, longly acuminate, nerved nearly to apex. Capsule on a long purple seta, oblique or horizontal, cylindric, arcuate, leptodermous, contracted below the mouth, pale yellowish-brown; lid conic, acute; annulus of 2—3 rows of cells; teeth of peristome pale ferruginous, processes entire, cilia perfect.

HAB.—Wet ground, about tree roots or decayed sticks. Fr. 4.

Hurstpierpoint and Cuckfield (*Mitten* 1855)!! Brighton and in the Weald (*Davies* 1857)!! Pithead, Stretford, Lanc. (*Hunt* 1859). Swamp at Ashley, Cheshire (*Hunt* 1865)!! Shere, Surrey (*Capron* 1868)!! Moidart, Inverness (*McVicar* 1896)!! Porth Dafarch, Holyhead (*Wilson*). Devil's bridge (*Bowman*). York (*Spruce*). Marske mill, Saltburn (*R. Barnes* 1886)!! Bredwardine, Hereford (*Binstead* 1893)!

Var. *β. oligorrhizon* (*Guemb.*) *Lindb.*

Stems sparingly branched, with few radicles, leaves shorter, less acuminate, minutely serrulate.

SYN.—*Amblystegium oligorrhizon* GUEMB. MS. BR. SCH. Bry. eur. fasc. 55—56, t. 6. SCHIMP. Synops. 593 (1860), 2 ed. 712.

*Ambl. varium* Var. *oligorrhizon* LINDB. Musc. scand. 32 (1879). HUSN. Musc. gall. 359.

HAB.—Govilon valley, Abergavenny (*Mitten*)!!

There is great confusion between this species and *A. radicale*, and it must be confessed they come very near each other; perhaps one cause of this may be Hedwig's figure, which was probably taken from the form *orthocladon*, in which the leaves are much less acuminate than in the ordinary state. The chief points of difference lie in the leaves, which in the present species are erecto-patent, with a stronger nerve, reaching into the point, and more incrassate areolation. It is the commoner plant of the two with us.

## 7. AMBLYSTEGIUM SERPENS (L.) Br. Sch.

Autoicous; in prostrate, deep green, much-branched tufts. Leaves oval lanceolate, longly acuminate, nerved to middle or less. Capsule subcylindric, arcuate, inclined. (T. LXXXIX, A.)

SYN.—*Muscus terrestris omnium minimus capitulis majusculis oblongis erectis* RAY Synops. 2 ed. 38, n. 11 (1696).

*Hypnum repens trichoides terrestre minimum, capitulis majusculis oblongis erectis* DILL. Cat. Giss. 216 (1719), et in RAY Synops. 3 ed. 85.

*Hypnum trichodes serpens, setis et capsulis longis erectis* DILL. Hist. musc. 329, t. 42, f. 64 (1741) et Herbar.

*Hypnum serpens* L. Sp. plant. 1130 (1753), Syst. nat. ii, 705. HUDS. Fl. angl. 429 (1762). WEISS Crypt. Goett. 277 (1770). NECK. Meth. musc. 175 (1771). WITHER. Bot. arr. ii, 689 (1776). LIGHTF. Fl. scot. ii, 763 (1777). WEBER Spic. fl. goett. 97 (1778). RELH. Fl. cant. 416 (1785). SIBTH. Fl. oxon. 302 (1794). HEDW. Musc. frond. iv, 45, t. 18 (1797), Sp. musc. 268. BRID. Musc. rec. II, P. II, 111 (1801), Sp. musc. II, 243 (1812), Mant. 183 (1819), Bry. univ. ii, 642 (1827). SM. Fl. brit. 1306 (1804), Eng. Bot. t. 1037. TURN. Musc. hib. 169 (1804). SCHULTZ Fl. Starg. 322 (1806). WEB. MOHR Bot. Tasch. 300 (1807). WAHLENB. Fl. lapp. 376 (1812), Fl. carpat. 359 (1814). SCHWAEGL. Suppl. I, P. II, 260 (1816). ROEHL. Deutsch. fl. iii, 110 (1813). MART. Fl. cr. erl. 15 (1817). HOOK. TAYL. Musc. br. 94 (1818). HOOK. Fl. scot. p. 2, 142 (1821). FUNCK Moost. 50, t. 45 (1821). GRAY Nat. arr. Br. pl. i, 754 (1821). HUEBEN. Musc. germ. 679 (1833). DE NOT. Syllab. 10 (1838). RABENH. D. kr. fl. II, S. 3, 292 (1848). C. MUELL. Synops. ii, 411 (1851). WILS. Bry. brit. 362 (1855). BERK. Handb. br. m. 96 (1863). HOBK. Syn. 163 (1873). BOUL. Musc. Fr. 79 (1884).

*Neckera serpens* WILLD. Prodr. Fl. Berol. n. 935 (1787).

*Hypnum subtile* (non HEDW.) DICKS. Fasc. IV, 17. SM. Eng. Bot. t. 2496.

*Hypnum spinulosum* HEDW. Sp. musc. 269, t. 69, f. 5—10.

*Hypnum contextum* HEDW. Sp. musc. 273, t. 72, f. 5—12 (1801).

*Amblystegium serpens* BR. SCH. Bry. eur. fasc. 55—56, p. 8, t. 3 (1853). SCHIMP. Synops. 591 (1860), 2 ed. 709. MILDE Bry. siles. 323 (1869). DE NOT. Epilogo 153 (1869). HOBK. Synops. 2 ed. 212 (1884). HUSN. Musc. gall. 357, t. 102 (1893). DIX. JAMES. Stud. Handb. 442 (1896).

Autoicous; in depressed soft tufts, dull, bright or yellowish green. Stem creeping, rooting in all its length, densely ramulose, branches attenuated, flexuoso-erect. Cauline leaves ovato-lanceolate, acuminate, remote, patulous, nerve thin, vanishing below apex, ramuline more crowded, generally subsecund, narrower, more acuminate and chlorophyllose; cells rhomboid-hexagonal, pellucid, the angular subquadrate in a single row. Perichætium pale, on a short branch; bracts erect, elongate, apiculate, thin-nerved, sulcate. Capsule incurvo-cernuous, elongate cylindraceous, subarcuate, expanded at mouth, constricted below it, yellow and rufescent, often two-coloured, finally ferruginous, lid convex-conic; annulus of 3 rows of minute cells; teeth pale ferruginous, patulous and incurved when dry, processes entire, cilia perfect.

HAB.—Damp shady banks, stones and tree trunks, common. Fr. 4—5.

Var. *β tenue* Schimp.

Plants very slender and matted, the branches straight, erect; leaves minute, with long points and a very short nerve; capsule short, more regular.

SYN.—SCHIMP. Synops. 592. HUSN. Musc. gall. 357.

HAB.—On tree trunks by streams. The Winnats, Derby (*Holt* 1882)!! Glen Dole (*Fergusson* 1867)! Winston bridge Teesdale, and Richmond Yorks. (*R. Barnes* 1890)!!

Var. *γ. depauperatum* Boulay.

Plants very slender, prostrate, rufescent or orange coloured, the branches very slender, with minute distant leaves, nerve faint, very short; capsule very short and nearly straight.

SYN.—*Hypnum serpens* Var. *depauperatum* BOUL. Musc. Fr. 79 (1884). HUSN. Musc. gall. 358.

*Ambl. serpens* Var. *salinum* CARRINGTON MS.

*Ambl. Cashii* R. DU BUYSSON Etud. de gen. *Amblystegium* 8 (1889).

HAB.—Sandy coast. Southport sands (*Wood* 1859)!! Malahide, Dublin (*Carrington* 1861). Hayle sands (*Curnow* 1885)!! Portstewart, Co. Derry (*Stewart* 1884)!! Reiss Links, Wick (*Fergusson* 1868)!!

This common moss is the centre of a group of closely allied species which are very troublesome to distinguish from each other; perhaps the form and direction of the leaves, and the size of their component cells, afford the best differential characters. The species is most variable, and Bridel enumerates 18 varieties, most of them ill-defined forms.

## 8. AMBLYSTEGIUM JURATZKÆ Schimp.

Autoicous; resembling *A. serpens* but more robust, deep green. Leaves subsquarrose, cordate-ovate, acuminate, nerved above half way, cells larger, rectangular at base. (T. XCI, A.)

SYN.—*Amblystegium Juratzkanum* SCHIMP. Synops. 693 (1860), 2 ed. 710. HUSN. Musc. gall. 358, t. 102 (1893). Flora Batava, t. 939.

*Hypnum Juratzkanum* BOUL. Musc. Fr. 74 (1884).

*Amblystegium serpens* Var. *Juratzkanum* R. DU BUYSS. Etud. du gen. *Amblystegium* 18 (1889).

Autoicous; laxly tufted, deep green; stem creeping, rooting, with short erect branches. Leaves subsquarrose, not crowded, cauline cordate-ovate, longly acuminate, acute, branch-leaves narrower, lanceolate-acuminate, nerved for  $\frac{2}{3}$  length, margin entire or feebly denticulate; cells laxer, elongato-rhomboid, basal quadrato-rectangular. Perich. bracts elongato-lanceolate, less suddenly acuminate, nerved, plicate; capsule subarcuate-cernuous, contracted below mouth, finally ferruginous, lid conic, apiculate, teeth orange with a hyaline border, endostome pale yellow.



HAB.—On stones in wet places, rare. Fr. 4—5.

Poynings, Sussex (*Mitten* 1895)!!

The wide leaves with larger cells differ from those of *serpens*, and their direction is also more or less squarrose, still it may be questioned whether this is anything more than a broad-leaved state of *A. serpens*.

### 9. *AMBLYSTEGIUM RADICALE* (*P. Beauv.*) *Mitt.*

Autoicous; in pale green depressed tufts. Leaves distant, patent, cordato-lanceolate, nerved to middle. Capsule on a long seta, subcylindric, arcuate. (T. LXXXVIII, E.)

SYN.—*Hypnum radicale* P. BEAUV. Prodr. 68 (1805). BRID. Sp. musc. II, 248 (1812), Mant. 183 (1819), Bry. univ. ii, 651. SCHWAEGL. Suppl. I, P. II, 255, t. 90 (1816).

*Hypnum humile* P. BEAUV. Prodr. 65.

*Stereodon radicalis* MITT. Journ. Linn. Soc. viii, 43 (1864).

*Amblystegium radicale* MITT. Journ. Linn. Soc. Bot. xii, 569 (1869).

Autoicous; plants slender in pale green depressed tufts. Primary stems trailing, with reddish radicles, and short erect, simple or ramulose branches. Leaves distant, patulous subcordate and decurrent at base, ovato-lanceolate, longly acuminate, subserrulate, the nerve vanishing about the middle; cells soft with little chlorophyl, oval-oblong, longer and narrower than in *A. serpens*, rather wider at base, quadrate at angles; branch-leaves longer and less divergent. Perich. bracts large, erect, ovato-lanceolate, acuminate, subserrulate above, nerve reaching base of acumen, thick; perigonal bracts broadly oval, acuminate, nerveless. Capsule suberect on a very long red seta, cylindraceous, arcuate, contracted below mouth, pale brown; lid conical, yellow; peristome as in *A. serpens*, cilia slightly trabeculate.

HAB.—Rotten sticks and humus in wet shady places, rare. Fr. 4—5.

Hurstpierpoint (*Mitten* 1854)!! Paddington, Warrington (*Wilson* 1864)! Old willows by Milnthorpe station (*Barnes* 1871)!! Newton in Bowland, Yorks. (*Slater* 1896)! Coatham marshes, Yorks. (*R. Barnes* 1892)!!

Var. *β. serotinum* Lindb.

Stem with long thick scattered papillose radicles; leaves with longer points; capsules yellowish-fuscescent.

SYN.—*Hypnum serpens β. serotinum* LINDB. in HARTM. Skand. fl. 9 ed. ii, 12 (1864).

*Hypnum pachyrrhizon* Lindb. MSS.

*Amblystegium porphyrrhizon* SCHIMP. Synops. 2 ed. 715 (1876).

*Amb. radicale* \* *pachyrrhizon* LINDB. Musc. scand. 32 (1879).

HAB.—In similar localities. Sand hills near Southport (T. Rogers 1875)!!

Professor Arnell suggests that Lindberg sent this moss to Schimper named *pachyrrhizon*, and that he through inadvertence published it under the name *porphyrrhizon*, but as Lindberg gives the locality Drottningholm both for it and his already published *serotinum*, there is little doubt that the two are identical.

The patent leaves of softer texture, with more attenuated points, and fainter nerve ending at the middle of the leaf are the characters separating *A. radicale* from *A. varium*, but that they stand very near to each other is evident by the way in which they have been confused, and it may be questioned whether there really are so many of these species distinct from *A. serpens* as our text-books describe.

*Amblystegium subtile* (HEDW.) BR. SCH. is a small slender species with suberect capsule, and leaves with a short faint nerve, and should certainly be found here, as it is scattered all over Europe.

#### 10. *AMBLYSTEGIUM CONFEROIDES* (Brid.) Br. Sch.

Autoicous; stem very slender, creeping, branched. Leaves minute, oval-lanceolate, entire, nerveless. Capsule sub-horizontal, firm, oblong; lid conic apiculate. (T. LXXXIX, B.)

SYN.—*Hypnum confervoides* BRID. Sp. musc. II, 153 (1812), Mant. 167 (1819), Bry. univ. ii, 583 (1827). SCHWAEG. Suppl. I, P. II, 218 (1816). FUNCK Moost. 58, t. 39 (1821). HUEBEN. Musc. germ. 677 (1833). DE NOT. Syllab. 11 (1838). RABENH. D. kr. fl. II, S. 3, 292 (1848). C. MUELL. Synops. ii, 414 (1851). HOBK. Synops. 163 (1873). BOUL. Musc. Fr. 80 (1884).

*Hypnum Conferva* SCHWAEG. Suppl. II, P. I, 158, t. 142 (1823).

*Leskea confervoides* SPRUCE in Lond. Journ. bot. iv, 182 (1845).

*Amblystegium confervoides* BR. SCH. Bry. eur. fasc. 55—56, p. 6, t. 2 (1853). SCHIMP. Synops. 590 (1860), 2 ed. 707. DE NOT. Epil. 156 (1869). MILDE Bry. siles. 323 (1869). HOBK. Synops. 2 ed. 212 (1884). HUSN. Musc. gall. 357, t. 102 (1892). DIX. JAMES. Stud. Handb. 442 (1896).

*Stereodon confervoides* LINDB. Musc. scand. 38 (1879).

Autoicous; cæspitant, dark green, opaque, fuscous when old. Stem very slender, trailing, vaguely branched, the branches pinnate. Leaves minute, remote, spreading or subsecund, appressed when dry, oval-lanceolate, longly acuminate, entire, nerveless; angular cells very few, quadrate, upper oblong-rhomboidal, firm. Perich. bracts larger, concave, lanceolate, plicate, longly acuminate, minutely denticulate. Capsule subhorizontal, oblong, curved, contracted below mouth; lid convex, obliquely apiculate, teeth lanceolate yellow, membrane of endostome as high as teeth, processes entire, with 1—3 cilia half their length.

HAB.—On stones in woods in calcareous districts, rare. Fr. 8.

Dovedale (*Dr. Fraser* 1866)!! Barrowfield, Westmoreland c. fr. (*Y. M. Barnes* 1868)!! Taddington Dale and Ravensdale (*Holt* 1882)!! Portstewart, Derry (*Stewart* 1884). Aitalore glen, Wicklow (*Lett* 1893)!! Aysgarth Force and Askrigg, Wensleydale (*R. Barnes* 1893)!! Richmond and Kisdon Force, Swaledale (*R. Barnes* 1889)!! Ebbor Gorge, Wells, Somerset (*Binstead* 1887)!

A rather stronger plant than *A. Sprucei*, but very near it in the form of leaves which are more tapering; the capsule differs considerably from it in form and direction.

## II. *AMBLYSTEGIUM SPRUCEI* (*Bruch*) *Br. Sch.*

Dioicous; minute, cæspitose. Stem filiform, erect, soft. Leaves remote, oblong-lanceolate, entire, nerveless. Perich. bracts coarsely serrate above, capsule minute, erect, obovate, with a short neck. (T. LXXXIX, C.)

SYN.—*Leskea Sprucei* BRUCH in lit. SPRUCE in Lond. J. Bot. 1845, p. 180. WILS. Bry. br. 330, t. 54 (1855).

*Leskea tenella* SCHIMP. MSS.

*Hynum confervoides* DRUMM. Musc. Amer. n. 190.

*Hynum Jungermannia* HAMPE MSS.

*Amblystegium Sprucei* BR. SCH. Bry. eur. fasc. 55—56 (1853). SCHIMP. Synops. 588 (1860), 2 ed. 705. MILDE Bry. siles. 322 (1869). HOBK. Synops. 163 (1873). BOUL. Musc. Fr. 82 (1884). HUSN. Musc. gall. 356, t. 102 (1893). DIX. JAMES. Stud. Handb. 441, t. 55 (1896).

*Hynum Sprucei* C. MUELL. Synops. ii, 415 (1851). LESQ. JAMES. Moss. N. Amer. 373 (1884).

*Platydictya Sprucei* BERK. Handb. Br. m. 145 (1863).

Dioicous; minute, in small pale green tufts. Stems soft, filiform, in fertile tufts denser, ascending with erect branches, in sterile laxer, long and vaguely creeping. Leaves distant, erecto-patent, narrowly oblongo-lanceolate, entire, nerveless, cells lax, hexagono-rhomboid, at angles quadrate; perich. bracts similar, longly acuminate, spinuloso-denticulate towards apex. Capsule minute, erect or subcernuous, from a distinct neck, obovate or turbinate, rufescent; lid convex, mamillar or apiculate. Teeth narrowly lanceolate, pale yellow, endostome without cilia.

HAB.—Shady calcareous rocks, rare. Fr. 6, very rare.

Tees side near Winch-bridge (*Spruce* 1843)! Rams Lum, Todmorden (*Nowell* 1849)!! Sheddon clough and Janet's cave, Malham (*Nowell* 1851). Southport (*Dr. Wood* 1853)! Rorig wood, Bowness (*Hunt* 1871). By the Tees at Rokeby (*R. Barnes* 1894)!! Black mountains, Brecon (*Binstead* 1895). Falls of Clyde, Lanark (*Wilkie* 1896)!! Richmond, Gunnerside and Kisdon in Swaledale, Aysgarth Force in Wensleydale; Gainford, Winston, Maize beck and Langdon beck (*R. Barnes*)!! Egglestone Abbey (*Baker*) All in Teesdale.

In the sterile state this moss is with difficulty distinguished from the last species, but the branches are straighter and simpler, and the leaves shorter and less acuminate.

12. **AMBLYSTEGIUM RIPARIUM** (L.) Br. Sch.

Autoicous; laxly tufted; stems long, flaccid, vaguely branched. Leaves patent, subcomplanate, oblong-lanceolate, entire, nerved above middle, cells 10—15 times long as broad. Capsule oblongo-cylindric. (T. LXXXIX, D.)

SYN.—*Hypnum riparium* L. Sp. pl. 1129 (1753), Syst. nat. ii, 704. HUDS. Fl. angl. 427 (1762). WEISS Cr. goett. 250 (1770). NECK. Meth. musc. 184 (1771). WITHER. Bot. arr. Br. veg. ii, 301 (1776). LIGHTF. Fl. scot. ii, 760 (1777). WEBER Spic. fl. goett. 80. RELH. Fl. cant. 415 (1785). ROTH Fl. germ. i, 470 (1788). SIBTH. Fl. oxon. 301 (1794). HOFFM. Deutsch. Fl. ii, 77 (1796). HEDW. Musc. fr. iv, 7, t. 3 (1797). Sp. musc. 241 (1801). ABBOT Fl. Bedf. 250 (1798). HULL Br. fl. P. 2, 273 (1799). SWARTZ Musc. succ. 63 (1799). BRID. Musc. rec. II, P. II, 176 (1801), Sp. musc. II, 112 (1812), Mant. 157 (1819), Bry. univ. ii, 412 (1827). SMITH Fl. brit. 1292 (1804), Eng. bot. t. 206c. TURN. Musc. hib. 152 (1804). SCHULTZ Fl. starg. 334 (1806). WEB. MOHR Bot. Tasch. 331 (1807). VOIT Musc. herbip. 111 (1812). SCHWABG. Suppl. I, P. II, 194 (1816). HOOK. TAYL. Musc. br. 92 (1818). HOOK. Fl. scot. P. 2, 141 (1820). FUNCK Moost. 56, t. 37 (1821). GRAY Nat. arr. i, 752 (1821). HUEBEN. Musc. germ. 619 (1833). DE NOT. Syllab. 4 (1838). RABENH. D. kr. fl. II, S. 3, 293 (1848). C. MUELL. Synops. ii, 321 (1851). WILS. Bry. brit. 364 (1855). BERK. Handb. br. m. 98 (1863). HOBK. Synops. 164 (1873). BOULAY Musc. Fr. 76 (1884). LESQ. JAMES Moss. N. Amer. 376 (1884). DIX. JAMES. Stud. Handb. 452 (1896).

*Amblystegium riparium* BR. SCH. Bry. eur. fasc. 55—56, p. 14, t. 8 (1853). SCHIMP. Synops. 597 (1860), 2 ed. 717. MILDE Bry. siles. 328 (1869). DE NOT. Epilogo 146 (1869). HOBK. Synops. 2 ed. 213 (1884). R. DU BUYSS. Etud. Gen. Amblys. 18 (1889). HUSN. Musc. gall. 363, t. 104 (1893).

*Stereodon riparius* MITT. Journ. Linn. Soc. viii, 43 (1864).

Autoicous; in lax soft depressed tufts, bright or yellowish green, very variable in size. Stem long, creeping, flaccid, vaguely branched; leaves somewhat crowded, widely spreading, often subcomplanate, rarely subsecund, shortly decurrent, broadly ovato- or oblongo-lanceolate, longly and slenderly acuminate, quite entire, nerved above middle, upper cells linear-rhomboid, 10—14 times long as wide, at base lax and rectangular. Perich. bracts longish subvaginant, outer spreading from the middle, inner elongated, bisulcate erect, with a thin nerve. Capsule horizontal, incurved, arcuate, oblongo-cylindric, pale ferruginous; lid large, orange, conical; teeth yellow, cilia appendiculate. Male infl. thick, bracts ovate, acuminate.

HAB.—On stones and wood by streams and ditches; common. Fr. 6.

Var. *β. longifolium* Schultz.

Robust, stems elongated; leaves complanate, large patulous, distant, lanceolate, attenuated into long points, yellowish green.

SYN.—*Hypnum longifolium* SCHULTZ Fl. Starg. 335. BRID. Sp. musc. II., 114, Mant. 158.

*Hyp. riparium δ. longifolium* BRID. Bry. univ. ii, 414.

*Amblystegium riparium η. longifolium* SCHIMP. Bry. eur.

HAB.—In pools and overflowed fields.



Roads, Northants (*Dixon* 1886)!! Cherrybank, Perth (*Meldrum* 1887)!! Dinsdale and Northallerton (*R. Barnes* 1879)!!

Var.  $\gamma$ . *abbreviatum* Schimp.

Plants small, with short stems and crowded erect branches; the leaves more crowded, narrower and more acuminate; capsule smaller, ovate or oblong.

SYN.—SCHIMP. Bry. eur. l. c. t. 9,  $\beta$ . Synops. 598, 2 ed. 718. DE NOT. Epilogo 147. HUSN. Musc. gall. 363.

*Amblystegium Hausmanni* DE NOT. in herb. SCHIMP. Synops. 2 ed. 720.

HAB.—Coatham marshes, Yorks. (*R. Barnes* 1892).

Like most semi-aquatic mosses, *A. riparium* varies exceedingly according to locality, and in size from 2—12 inches in length. I have retained two of the best marked varieties, others which have been described being transition forms; thus Var.  $\beta$ . passes into *elongatum*, and in an extreme state into *inundatum* SCHIMP. The Var.  $\gamma$ . has quite a different habit, and resembles a small *Brachythecium*.

### 13. AMBLYSTEGIUM TRICHOPODIUM (*Schultz*) C. H.

Autoicous; stem prostrate with slender ascending branches. Leaves remote, patulous, subsquarrose, cordato-lanceolate, nerved half-way, cells 4—8 times long as broad. Capsule oblong, curved. (T. LXXXIX, E.)

SYN.—*Hypnum trichopodium* SCHULTZ Fl. starg. 324 (1806). BRID. Sp. musc. II, 113 (1812), Mant. 158 (1819).

*Hypnum Schultzii* BLAND. Musc. exsic. fasc. III, n. 150.

*Hypnum riparium* Var.  $\epsilon$ . *trichopodium* BRID. Bry. univ. ii, 415 (1827). HUEBEN. Musc. germ. 620 (1833). BOUL. Musc. Fr. 77 (1884).

*Amblystegium riparium* Var. *trichopodium* SCHIMP. Bry. eur. fasc. 55—56, t. 9 (1853), Synops. 598 (1860), 2 ed. 718. DE NOT. Epil. 147 (1869). R. DU BUYSS. Etud. gen. Amblyst. 19 (1889). HUSN. Musc. gall. 363 (1893).

Autoicous; pale yellowish-green, stem prostrate, ascending, the branches slender, suberect, with few ramuli. Leaves remote, patulous, lax and somewhat squarrose, cordate-ovate, lanceolate-acuminate, nerved beyond the middle; cells resembling those of *A. riparium*, but 4—8 times as long as broad. Perich. bracts lax, oblong, elongate acuminate, seta very long and slender; capsule oblong horizontal, incurved, leptodermous, fuscous, lid conical.

HAB.—Watery places, rare.

Var.  $\beta$ . *Kochii* (*Br. Sch.*) Lindb.

Leaves crowded or distant, broader at base, the margin faintly denticulate; perich. bracts (fig. 2) denticulate towards the attenuated point.

SYN.—*Amblystegium Kochii* BR. SCH. Bry. eur. fasc. 55—56, p. 13, t. 6. SCHIMP. Synops. 596, 2 ed. 716. MILDE Bry. siles. 327. HUSN. Musc. gall. 362. DIX. JAMES. Stud. Handb. 449.

*Amblystegium curvipes* GUEMB. in Bry. eur. l. c. p. 14, t. 7. SCHIMP. Synops. 597, 2 ed. 717.

*Amblystegium ambiguum* DE NOT. Epilogo 144.

*Hypnum riparium* \* *Kochii* BOUL. Musc. Fr. 77.

*Amblystegium trichopodium* Var. *Kochii* LINDB. Acta soc. sci. fenn. x, 275 (1872).

*Amblystegium riparium* Var. *Kochii* R. DU BUYSS. op. c. 20.

HAB.—Pond Leigh, Hurstpierpoint (*Mitten*).

This plant has quite a different aspect from *A. riparium*, and by its subsquarrose leaves with shorter and broader cells certainly stands higher than a variety. *A. Kochii* only deviates from it in some trifling particulars, and must go with it, whether as species or variety.

Sect. 2. CAMPYLIADDELPHUS *Lindb.* Stems prostrate, the branches irregular and crowded or ascending and fastigate. Leaves subsquarrose, scarious, from a broadly ovate base, running out into a long acumen, nerve one or obsolete, cells very narrow, linear and flexuose, large and diaphanous at basal angles. Paraphyllia absent.

#### CLAVIS TO THE SPECIES.

Leaves nerved.

Leaves erecto-patent, lanceolate-subulate, nerved nearly to point  
 ——— ovato-lanceolate, nerved half-way.

Leaves squarrose, ovato-acuminate, nerve faint, half-way,

Leaves nerveless.

Stem creeping, leaves lanceolate-piliform.

— erect, leaves deltoid-ovate, acuminate.

*elodes*.

*polygamum*.

*chrysophyllum*.

*protensum*.

*stellatum*.

#### 14. AMBLYSTEGIUM ELODES (*Spruce*) *Lindb.*

Dioicous; procumbent, stems slender, subpinnate with slender suberect branches. Leaves spreading, lanceolate, very longly acuminate, nerved nearly to point, entire. Capsule oblong, curved, cernuous. (T. XC, A.)

SYN.—*Hypnum polymorphum* (non HEDW.) TAYL. in MACK. Fl. hibern. P. 2, p. 44 (1836).

*Hypnum elodes* SPRUCE in Lond. Journ. Bot. 1845, p. 174. C. MUELL. Synops. ii, 434 (1851). WILS. Bry. brit. 362, t. 56 (1855). SCHIMP. Coroll. Bry. eur. 130 (1856), Synops. 601 (1860), 2 ed. 723. BERK. Handb. br. m. 99 (1863). MILDE Bry. siles. 341 (1869). HOBK. Synops. 165 (1873). BOUL. Musc. Fr. 70 (1884). HUSN. Musc. gall. 366, t. 114 (1893). DIX. JAMES. Stud. Handb. 453 (1896).

*Amblystegium elodes* LINDB. Musc. scand. 32 (1879).

Dioicous; slender, in wide tufts, soft olivaceous or yellowish green, subpinnate; branches erect, acute incurved at apex. Stem-leaves distant, divergent, branch-leaves closer, from an ovate base gradually lanceolate-subulate, the nerve vanishing in the long acumen, margin plane, entire or obsoletely serrate; cells linear, the basal larger, rectangular, incrassate, yellow and quadrate at the angles. Inner perich. bracts suddenly subulate, with long points and thinner nerve; capsule on a long seta, subcylindric, curved inward, annulus broad of 3 rows of cells, teeth yellowish, lanceolate-subulate, processes of endostome entire, cilia 2—3.

HAB.—Swampy ground; not common. Fr. 4—5.

Anglesey (*Rev. H. Davies* in *Herb. Turner*). Killiney, Dublin (*Taylor* 1814). Stockton Forest, York (*Spruce* 1842). Sands at Southport (*Wilson*)!! Tyfry bog, Anglesey (*Wilson*). Semerwater, Wensleydale (*R. Barnes* 1894)!! Killarney and Lough Corrib (*Moore*).

# 15. *AMBLYSTEGIUM CHRYSOPHYLLUM* (*Brid.*) *De Not.*

Dioicous; stem procumbent, pinnate. Leaves patent, subsquarrose, from a cordate base, ovate-acuminate, entire, nerved above half-way. Capsule subcylindric, curved, cernuous. (T. XC, B.)

SYN.—*Hypnum chrysophyllum* BRID. *Musc. rec.* II, P. II, 84, t. 2, f. 2 (1801). *Sp. musc.* II, 200 (1812). *Mant.* 175 (1819). *Bry. univ.* ii, 598 (1827). P. BEAUV. *Prodr.* 62 (1805). ROEHL. *Deutsch. fl.* iii, 105 (1813). SCHWAG. *Suppl.* I, P. II, 275 (1816). SCHULTZ *Suppl. fl. starg.* 79 (1819). FUNCK *Moost.* 64, t. 47 (1821). HUEBEN. *Musc. germ.* 672 (1833). DE NOT. *Syllab.* 42 (1838). WILS. *Bry. brit.* 366 (1855). SCHIMP. *Synops.* 602 (1860), 2 ed. 724. BERK. *Handb. br. m.* 101, t. 6, f. 5 (1863). MILDE *Bry. siles.* 342 (1869). HOBK. *Synops.* 166 (1873). LESQ. JAMES MOSS. N. Amer. 378 (1884). BOUL. *Musc. Fr.* 68 (1884). HUSN. *Musc. gall.* 365, t. 104 (1893).

*Hypnum polymorphum* p.p. (non HEDW.) HOOK. TAY. *Musc. brit.* 107 (1818). RABENH. D. kr. fl. ii, S. 3, 279 (1848). SCHIMP. *Bry. eur. fasc.* 57—61, p. 13, t. 3 (1854). HOOK. in *Eng. Bot. t.* 2671.

*Hypnum squarrosulum* BALS. DE NOT. *Prodr. Bry. mediol.* 92.

*Stereodon chrysophyllus* MITT. *Journ. Linn. Soc.* viii, 43 (1864).

*Amblystegium chrysophyllum* DE NOT. *Epilogo* 148 (1869).

*Hypnum stellatum* \* *chrysophyllum* DIX. JAMES. *Stud. Handb.* 455 (1896).

Dioicous; in laxly interwoven glossy yellow-green, or fulvous tufts. Stems elongated, slender flexuose, prostrate, pinnate, the branches decumbent or suberect. Leaves crowded, from an erect concave base, ovato-deltoid, narrowly acuminate or almost subulate, patulo-squarrose, entire, with a very thin nerve to beyond the middle, cells linear, 5—8 times long as broad, at angles quadrate. Perich. bracts squarrose, ovate, gradually longer and striate, oblongate, subulate at point.

Capsule on a long purple seta, incurvo-cylindrical, pale orange, with a broad annulus, lid conoid, obtuse, peristome pale yellow, processes entire, lanceolate-subulate, cilia 2—3.

HAB.—Damp calcareous rocks and fallow fields. Fr. 5.

Old Trafford (*Hunt* 1863). Portreath, Cornwall (*Curnow* 1866). Hole of Horcum, Yorks. (*Stabler* 1868)!! Ashton (*Gordon* 1871). Malahide and Portrane, Dublin (*Moore*).

Var. *β. erectum* *Bagnall*.

In dense yellowish-green tufts, 1—2 in. high; stems erect, pinnate, with numerous short ascending branches, upper leaves falcato-secund, subdenticulate at base.

SYN.—*Hypnum chrysophyllum* var. *erectum* BAGN. in Journ. Bot. 1896, p. 111. DIX. JAMES. Stud. Handb. 455.

HAB.—Banks of the Dove above Milldale, Staffordshire (*Bagnall* 1895)!! Near Ripley, Yorks. (*L. f. Cocks* 1896)!!

Nerveless leaves are sometimes found intermixed with the usual nerved ones, and not otherwise differing from them; indeed this and the next two species are very closely allied, and may have to be united.

# 16. AMBLYSTEGIUM PROTENSUM (*Brid.*) *Lindb.*

Dioicous; stem creeping, pinnate. Leaves distant, squarrose, ovato-lanceolate, subulate, nerveless or with a very faint nerve. Capsule subcylindric. (T. XC, C.)

SYN.—*Hypnum protensum* BRID. Musc. rec. II, P. II, 85, t. 2, f. 3 (1801), Sp. musc. II, 201 (1812), Mant. 175 (1819). TURN. Musc. hib. 161 (1804). FUNCK Moost. 63, t. 47 (1811).

*Hypnum stellatum β. protensum* ROEHL. Deutsch. fl. iii, 103 (1813). BRID. Bry. univ. ii, 602 (1827). SCHIMP. Bry. eur. fasc. 57—61, p. 14 (1854). Synops. 603, 2 ed. 725. DE NOT. Epilogo 171 (1869). HUSN. Musc. gall. 366 (1893). DIX. JAMES. Stud. Handb. 455 (1896).

*Amblystegium protensum* LINDB. Musc. scand. 32 (1879).

Dioicous; in pale golden or rufescent silky tufts. Stems depressed, long and trailing, flexuose, simply and irregularly pinnate, reddish, the pinnæ spreading at right angles and increasing in length upward. Leaves imbricated, from a concave base lanceolate, suddenly ending in a long piliform acumen, very patent, nerveless. Perich. bracts smaller, crowded, seta long, erect, purple; capsule inclined, subcylindric arcuate, spadiceous, lid purple, conic acute.

HAB.—Wet rocks and stones in calcareous districts; not common. Fr. 6.



Heslington Fields, York, c. fr. (*Spruce* 1844)!! Miller's dale (*Holt* 1830)!! Stoke Bruerne and Roade, Northants (*Dixon* 1837)!! Falcon clints, Teesdale, and Kildon Force, Swaledale (*Barnes* 1837)!!

Although this moss is generally referred to *A. stellatum*, it is really far more related to the last species, and just as nerveless leaves are found on the latter, so we occasionally find on the present leaves faintly nerved halfway. The multipinnate trailing stems closely clasping the stones is quite characteristic, and with the highly attenuated leaves and perichæial bracts, give it more than a varietal distinction.

### 17. *AMBLYSTEGIUM STELLATUM* (*Schreb.*) *Lindb.*

Dioicous; more robust, stems erect, irregularly branched, the branches erect, cuspidate. Leaves squarrose deltoid-ovate, acuminate entire nerveless, angular cells large quadrate and diaphanous. Capsule oblong, curved, cernuous. (T. XC, D.)

Syn.—*Hypnum coma lutescente, extremitatibus stellatis* DILLEN. Hist. musc. 302, t. 39, f. 35 (1741) et Herbar.

*Hypnum stellatum* SCHREB. Spic. Fl. Lips. 92 (1771). DICKS. Pl. crypt. F. I, 5, t. 1, f. 7 (1785). TIMM Fl. megap. n. 316 (1788). WITHER. Bot. arr. 3 ed. iii, 846 (1796). HOFFM. Deutsch. fl. ii, 65 (1796). ROTH Fl. germ. iii, P. 1, 303 (1800). HEDW. Sp. musc. 280 (1801). BRID. Musc. rec. II, P. II, 179, t. 6, f. 2 (1801), Sp. musc. II, 200 (1812), Mant. 175 (1819), Bry. univ. ii, 600 (1827). SWARTZ Musc. succ. 183 (1798). SIBTH. Fl. Oxon. 301 (1794). ABBOT Fl. Bedf. 246 (1798). HULL Br. fl. P. 2, 268 (1799). SMITH Fl. brit. 1322 (1804), Eng. bot. t. 1302. SCHULTZ Fl. starg. 335 (1806). WEB. MOHR Bot. Tasch. 350 (1807). VOIT Musc. herb. 113 (1812). ROEHL. Deutsch. fl. iii, 102 (1813). SCHWAEG. Suppl. I, P. II, 274, et II, P. I, 161, t. 144 (1823). MART. Fl. cr. erl. 30 (1817). HOOK. TAYL. Musc. br. 108 (1818). HOOK. Fl. scot. P. 2, 146 (1821). FUNCK Moost. 63, t. 47 (1821). GRAY Nat. arr. Br. pl. i, 763 (1821). HUEBEN. Musc. germ. 673 (1833). DE NOT. Syllab. 41 (1838), Epilogo 171 (1869). RABENH. Deutsch. kr. fl. II, S. 3, 280 (1848). C. MUELL. Synops. ii, 435 (1851). WILS. Bry. br. 366 (1855). BR. SCH. Bry. eur. fasc. 57—61, p. 14, t. 4 (1854). SCHIMP. Synops. 603 (1860), 2 ed. 725. BERK. Handb. br. m. 102, t. 6 (1863). MILDE Bry. siles. 343 (1869). HOBK. Synops. 166 (1873). BOULAY Musc. Fr. 67 (1881). LESQ. JAMES Moss. N. Amer. 379 (1884). HUSN. Musc. gall. 365, t. 104 (1893). DIX. JAMES. Stud. Handb. 454 (1896).

*Hypnum comosum* VILLARS Pl. Dauph. iii, 904 (1786).

*Amblystegium stellatum* LINDB. Musc. scand. 32 (1879).

Dioicous; robust, erect or decumbent, in lax soft, yellowish-green tufts. Stems subdichotomous, with erect fastigate branches. Leaves crowded, squarrose, from an erect cordate base, subdecurent at the basal angles, ovato-lanceolate, acutely acuminate, entire, scariose, nerveless or with two very short faint nerves; cells very narrow, linear, 8—10 times long as broad, the basal angular cells rectangular, incrassate, pellucid or orange. Perichætium subvaginant, the lower bracts recurved from middle, inner erect, sulcate, with a filiform apiculus. Capsule on a red seta, incurved cernuous, subcylindric,

fuscous; lid conical, pointed, peristome yellow. Male plant slender, with few branches.

HAB.—Marshy ground among grass; common. Fr. 6, rare.

Sometimes we find a short yellowish single or forked nerve present, but so faint that it looks like a mere stria; the size of the plant also varies considerably though generally retaining the habit of the ordinary form.

# 18. *AMBLYSTEGIUM POLYGAMUM* Br. Sch.

Polygamous; resembling *A. stellatum*, stems procumbent, subpinnate. Leaves erecto-patent, ovato-lanceolate, entire, nerved above half-way. Capsule oblong, subcernuous. (T. XC, E.)

SYN.—*Amblystegium polygamum* BR. SCH. Bry. eur. fasc. 55–56, p. 16, t. 10 (1853). LINDB. Musc. scand. 32 (1879).

*Hypnum polygamum* WILS. Bry. brit. 365, t. 56 (1855). SCHIMP. Coroll. 131 (1856), Synops. 604 (1860), 2 ed. 726. BERK. Handb. br. m. 102 (1893). MILDE Bry. siles. 345 (1869). HOBK. Synops. 166 (1873). BOUL. Musc. Fr. 65 (1884). LESQ. JAMES MOSS. N. Amer. 379 (1884). HUSN. Musc. gall. 366, t. 104 (1893). DIX. JAMES. Stud. Handb. 453 (1896).

*Hypnum nodiflorum* WILS. MS.

Polygamous; in lax spreading yellowish-green or fulvescent tufts. Stems subpinnate with short slender divergent branches. Leaves erecto-patent, sometimes subsecund, scariose, from a narrow base ovato-lanceolate, narrowed into a long acute acumen, entire, nerved half-way or more, cells narrow, linear, laxer at base, 3–4 rows rectangular larger and coloured yellow at the subexcavate angles. Female and synoicous infl. aggregated at base of perichætil branch, which is very short; perich. bracts erect, inner lanceolate, sulcate, with a subulate point and slender nerve; seta slender, capsule incurvo-cernuous and horizontal, ferruginous, lid pointed.

HAB.—In swampy places. Fr. 5.

Sands of Barrie, Dundee (*Greville*). Portmarnock and Malahide sands, Dublin (*Moore*). Southport sands (*Marrat*)!! Taunton and Rochdale, Lanc. (*Gordon*).

## Var. *β. stagnatum* Wils.

Plants larger and more robust; stem longer, suberect, more pinnate, leaves with a longer nerve.

SYN.—*Hypnum stagnatum* WILS. MS.

*Hypnum polygamum β. stagnatum* WILS. Bry. brit. 365.

*Hypnum fallaciosum* JURATZKA MS.

HAB.—Near Newton viaduct, Warrington (*Wilson*)!! Near York (*Spruce*). Copgrove, Yorks. (*Rev. J. Dalton*). Near Airth (*Lyle*). Stratford-on-Avon (*Bagnall*). Arklow (*Moore*).

This moss resembles both *A. stellatum* and *A. riparium*, and is at once known from the former by the distinct nerve and different areolation of the ascending leaves, and from the latter by the different leaf-base and cells, and scariose texture.

Sect. 3. DREPANOCLADUS *C. Muell.* (1851). Stems pinnate or vaguely branched, both stem and branches uncinatate at apex. Leaves distinctly falcato-uncinate, with a single nerve, the cells elongate, linear.

This section, rechristened *Harpidium* by Sullivant in 1856, is a most difficult one to arrange, on account of the different views as to the value of the species, held by different authors. Sanio has treated some of these as hybrids, some as subspecies and forms, and Renauld in *Husnot's Muscologia gallica* has added a large number of forms and varieties, these being the result of an exhaustive examination of specimens from many authors demand our attentive consideration. I have preferred the older arrangement of Schimper and Lindberg, as leading us more readily to the identification of specimens, which undoubtedly, as in other aquatic mosses, vary considerably.

#### CLAVIS TO THE SPECIES.

Leaves longitudinally sulcate when moist.	
Leaves auricled minutely denticulate.	
Dioicous, stem densely radiculose; leaves deltoid at base.	<i>glaucum.</i>
— without radicles; leaves ovate at base.	<i>falcatum.</i>
Autoicous, leaves narrow at base.	<i>aduncum.</i>
Leaves not auricled, entire.	<i>vernicosum.</i>
Leaves not sulcate when moist.	
Leaves auricled.	
Angular cells incrassate, yellowish.	<i>Sendtneri.</i>
— inflated, hyaline.	
Leaves longly lanc. denticulate, nerved into acumen.	
Dioicous, leaves falcato-secund, faintly plicate.	<i>exannulatum.</i>
Autoicous, stem-leaves flexuose, only secund at top.	<i>fluitans.</i>
Leaves ovato-lanceolate, entire, nerved to $\frac{3}{4}$ length.	<i>Kneiffii.</i>
Leaves not auricled.	
Robust, leaves densely crowded, wide, concave.	
Leaves hardly hooked, rugulose when dry.	<i>lycopodioides.</i>
— strongly circinate, not altered by drying.	<i>revolvens.</i>
Slender, leaves twisted when dry, acumen short, cells shorter.	<i>intermedium.</i>

#### 19. AMBLYSTEGIUM GLAUCUM (*Lam.*) *Lindb.*

Dioicous; stem ascending, pinnate, radiculose. Leaves secund, circinate, spreading, cordate and ovato-lanc., acuminate, plicato-striate, subserrulate, nerved above half-way. Caps. oblong cernuous, lid conical. (T. XCI, B.)

SYN.—*Hypnum repens filicinum crispum* DILL. in RAY Synops. 3 ed. 85, n. 32 (1724), Hist. musc. 282, t. 36, f. 19 (1741) et Herbar.

*Hypnum glaucum* LAMARCK Fl. Franc. i, 522 (1778). LAM. et CAND. Syn. Fl. gall. 108 (1805).

*Hypnum filicinum* VILL. Pl. Dauph. iii, 897 (1786). SCHWAEG. Suppl. I, P. II, 297, ut var.

*Hypnum commutatum* HEDW. Musc. frond. iv, 68, t. 26 (1797), Sp. musc. 284 (1801). SWARTZ Musc. suec. 56 (1799). BRID. Musc. rec. II, P. II, 57 (1801), Sp. musc. II, 211 (1812), Mant. 177 (1819), Bry. univ. ii, 523 (1827). ROTH Fl. germ. 284 (1800). SMITH Fl. brit. 1333 (1804), Eng. Bot. t. 1569. TURN. Musc. hib. 196 (1804). P. BEAUV. Prodr. 62 (1805). WEB. MOHR Bot. Tasch. 356 (1807). VOIT Musc. herb. 109 (1812), et in STURM Deutsch. Fl. II, f. 14. WAHLEN. Fl. lapp. 379 (1812), Fl. carp. 361 (1814). ROEHL. Deutsch. Fl. iii, 113 (1813). HOOK. TAYL. Musc. br. 112 (1818). FUNCK Moost. 66, t. 52 (1821). GRAY Nat. arr. i, 765 (1821). HUEBEN. Musc. germ. 687 (1833). DE NOT. Syll. 53 (1838). RABENH. D. kr. fl. II, S. 3, 277 (1848). BR. SCH. Bry. eur. fasc. 57—61, Mon. p. 39, t. 25 (1854). WILS. Bry. brit. 393 (1855). SCHIMP. Synops. 613 (1860), 2 ed. 741. BERK. Handb. br. m. 121, t. 10, f. 5 (1863). MILDE Bry. siles. 354 (1869). HOBK. Synops. 170 (1873). BOULAY Musc. Fr. 45 (1884). LESQ. JAMES Moss. N. Amer. 387 (1884). HUSN. Musc. gall. 395, t. 114 (1894). DIX. JAMES. Stud. Handb. 466 (1896).

*Hypnum diastrophyllum* SWARTZ Musc. suec. 58. WAHLEN. Fl. lapp. 379, Fl. carp. 361.

*Amblystegium commutatum* DE NOT. Epilogo 149 (1869).

*Amblystegium glaucum* LINDB. Musc. scand. 32 (1879).

Dioicous; in tall dense rigid tufts, deep or yellow-green, ochraceous below and often coated with calcareous deposit. Stem dichotomous, pinnate, erect or procumbent, rufo-tomentose, with numerous lanceolate and subulate paraphyllia. Cauline leaves rather remote, cordato-triangular and auricled at base, narrowly falcate and acuminate, many-sulcate, basal wing plane, eroso-denticulate at margin, auricle decurrent, entire, orange, excavate to nerve, which is stout, yellowish and vanishing in apex; ramuline narrower, crowded, cirrate at point when dry. Cells very narrow, long, subflexuose-linear, those above the auricle small pale, hexagono-quadrate, of the auricle orange and incrassate. Perich. bracts long pale lanceolate, inner acutely acuminate, deeply sulcate, strong-nerved. Capsule on a long purple seta, cernuous, oblongo-cylindrical, ochreous-brown, strongly arcuate when dry, lid convex-conic, acute, annulus broad; teeth large, lineal-lanceolate, orange with a hyaline limb, endostome with rimose processes and three long cilia. Male plant smaller and more irregularly branched.

HAB.—Dripping calcareous rocks by streams and in wet woods; common. Fr. 5—6.

Closely resembling *A. filicinum*, but differing in the more entire leaves and abundant paraphyllia; it generally forms the nucleus of so-called "petrified moss."

Var. *β. sulcatum* (Schimper).

Stem very slender, yellowish-green, procumbent or suberect, without radicles but with many paraphyllia. Leaves secund, subinvolute, shorter, from a broadly ovate base, suddenly narrowly lanceolate, acuminate, sulcate;



nerve weak, reaching middle, upper cells narrowly hexagono-rhomboid, obtuse at end, 3—5 times longer than broad, those at base large, yellow, hexagono-rectangular.

SYN.—*Hyßnum sulcatum* SCHIMP. Synops. 699, 2 ed. 744. HOBK. Synops. 170. HUSN. Musc. gall. 397, t. 114

*H. subsulcatum* SCHP. Synops. 698. DE NOT. Epilogo 152 (a more slender form).

*Hyßnum Breadalbanense* F. B. WHITE in Tr. Bot. Soc. Edin. ix, 198, t. 3 (1868). HOBK. Synops. 172 (1873).

*Ambi. glaucum* Var. *sulcatum* LINDB. Musc. scand. 32.

*H. commutatum* \* *sulcatum* DIX. JAMES. Stud. Handb. 468.

HAB.—Wet alpine rocks, rare. Ben Lawers (*Dr. White* 1865)! !

This appears to be an ill-developed variety of the common plant, and the cauline leaves differ considerably in width and length of the acumen. It has not been found in fruit

## 20. *AMBLYSTEGIUM DECIPIENS* De Not.

Dioicous; pinnate with short crowded branches and slender paraphyllia. Stem leaves subsquarrose, cordate-deltoid, acuminate, narrowed at base, papillose at back. (T. XCI, C.)

SYN.—*Hyßnum rigidulum* FERG. in litt. (1865).

*Thuidium decipiens* DE NOT. Epil. 233 (1869). HOBK. Synops. 146 (1873). SCHP. Synops. 2 ed. 612 (1876). PHILIB. in Rev. bryol. 1884, p. 3. DIX. JAMES. Stud. Handb. 383 (1896).

*Hyßnum Notarisii* BOUL. Fl. crypt. de l'Est 597 (1872). HUSN. Musc. gall. 397, t. 114 (1894)

*Amblystegium glaucum* Var. *decipiens* LINDB. Musc. scand. 32 (1879).

Dioicous; in loose green tufts, with reddish radicles, and short subulate or forked paraphyllia. Stems pinnate, the branches close, simple, short slender and of equal length. Cauline leaves subsquarrose, broadly cordate-deltoid, shortly cuspidate, from a narrow subsaccate decurrent base, strongly plicate, margin reflexed below, denticulate at base and apex, intermixed with these, but fewer, are thinner broadly ovate leaves, which suddenly end in a short apiculus; nerve strong, vanishing below apex; upper cells linear-rhomboid and vermicular, with conical papillæ on the back, at angles lax, hexagonal; branch-leaves small falcato-second, ovate acuminate, nerved beyond middle. Perich. bracts membranous, pale, appressed, outer from a slightly plicate oblong

base, attenuate, subulate, nerved beyond middle. Capsule oblong, arcuate, cernuous, brown. Male infl. gemmiform, bracts ovate, acute.

HAB.—Wet places on mountains, sterile.

Glen Prosen, Clova (*Fergusson* 1865)!! Ben Lawers (*Stirton* 1866)!! Glen Callater (*Hunt* 1870). Bogs at Auchinblae, Kincardine (*Hunt* 1871)!! Crosscliff, Saltersgate, Yorks. (*Slater* 1885)!!

This is certainly no *Thuidium*, but a very close ally if not a variety of *Ambl. glaucum*, and it may be noted that an approach to the dimorphous leaves of the present plant may also be observed in the Var. *sulcatum*; the papillæ are usually very distinct on the bracts of the male inflorescence, but are often but poorly developed on the leaves. The fruit has been found in the Canton de Vaud, Switzerland, by Philibert.

## 21. *AMBLYSTEGIUM FALCATUM* (*Brid.*) *De Not.*

Dioicous; robust, yellowish-brown, with few paraphyllia, branches irregular subpinnate. Leaves rigid, oblong-lanceolate, falcato-secund; basal cells orange strongly incrassate. Capsule stouter. (T. XCI, D.)

SYN.—*Hypnum palustre erectum, summitatibus aduncis* Var. *crassior* DILLEN. Hist. musc. 292 (1741), et Herbar.

*Hypnum falcatum* BRID. Musc. rec. II, P. II, 63, t. 1, f. 6 (1801), Sp. musc. II, 212 (1812), Mant. 178 (1819), Bry. univ. ii, 526 (1827). WEB. MOHR Bot. Tasch. 359 (1807). ROEHL. Deutsch. fl. iii, 114 (1813). SCHWÆG. Suppl. I, P. II, 304 (1816). HUEBEN. Musc. germ. 695 (1833). DE NOT. Syllab. 51 (1838). MILDE Bry. siles. 355 (1869). HOBK. Synops. 170 (1873). SCHIMP. Synops. 2 ed. 742 (1876). HUSN. Musc. gall. 396, t. 114 (1894).

*Hypnum commutatum*  $\beta$ , *falcatum* C. MUELL. Synops. ii, 423 (1851). BR. SCH. Bry. eur. fasc. 55-56, p. 39, t. 26 (1853), Synops. 613 (1860). HARTM. Skand. fl.

*H. rugosum* DICKSON II, 12 (1790). Eng. Bot. t. 2250 p.p.

*H. aduncum* HOOK. TAYL. Musc. br. 111 (1818) p.p.

*H. commutatum*  $\beta$ , *condensatum* WILS. Bry. br. 393 (1855).

*H. controversum* WILS. MSS.

*H. commutatum* \* *falcatum* BOULAY Musc. Fr. 46 (1884). DIX. JAMES. Stud. Handb. 467 (1896).

*Amblystegium falcatum* DE NOT. Epilogo 148 (1869).

Dioicous; resembling *Ambl. glaucum*, but more robust, laxly or densely cæspitose, rather rigid, yellowish brown, ferruginous at base. Stem strong, erect or ascending, not radiculose, sparingly branched and with few paraphyllia. Leaves larger, more solid, more or less falcate, from an ovate-oblong base, very minutely serrulate at margin, gradually lanceolate-subulate, less deeply sulcate, shortly decurrent and less

excavate at angles; ramuline leaves less subulate, not cirroso-flexuose, nerve stout, yellow, reaching beyond middle to near apex; leaf-cells very narrow, longish vermicular, at base and angles large brown and oblongo-rectangular. Perichæcium as in *A. glaucum*. Caps. on a strong purple seta, cernuous, oval-oblong, subarcuate, brown, when dry strongly arcuate and constricted below mouth; lid convex-conic, annulus narrow, teeth narrower less subulate, processes entire at keel, cilia 2—3.

HAB.—Bogs and springs in calcareous districts. Fr. 6.

Var. *β. gracilescens* Schp.

Very slender, procumbent or prostrate, irregularly branched, the branches nearly simple. Leaves small, glossy, falcato-secund, faintly plicate, rufo-fuscescent, strongly nerved.

SYN.—*H. falcatum* Var. *β. gracilescens* SCHIMP. Synops. 2 ed. 743.

HAB.—Wet rocks in mountains, rare.

Ape Tor, Staffordshire (*Rev. A. Ley* 1881). Ben Lawers (*Dixon* 1893). Yorkshire.

Var. *γ. fluctuans* Br. Sch.

Stem long, deep green, fasciculate-branched, pinnate, robust; paraphyllia few or none. Leaves subfalcato-secund, the apical strongly falcate, scarcely sulcate or auricled; nerve stout, prolonged to apex, basal cells less distinct.

SYN.—*H. commutatum* Var. *fluctuans* BR. SCH. Bry. eur. fasc. 57—51, p. 39. SCHIMP. Synops. 613.

*H. irrigatum* ZETT. Musc. Pyren. n. 242. HUSN. Musc. gall. 396, t. 114.

*H. virescens* BOUL. Fl. cr. de l'Est.

*H. napæum* LIMPR. Kr. fl. Schless. 475.

*H. falcatum* Var. *virescens* SCHPR. Syn. 2 ed. 743.

HAB.—Wet rocks and waterfalls, not common.

Rigg mill, Whitby (*Braithwaite* 1842)!! Malham, Yorks. (*Wilson* 1839)!! Spring near High Force, Teesdale (*Dixon* 1896)!! Hale moss.

## 22. AMBLYSTEGIUM SENDTNERI (Schp.) De Not.

Dioicous; yellowish or brownish-green, slender tall and pinnate. Leaves crowded, falcato-secund, ovato-lanceolate, acuminate, entire, not plicate, the nerve strong vanishing in the acumen, cells firm, auricles decurrent. Perich. bracts sulcate. Capsule elongate, subcylindric. (T. XCII).

SYN.—*Hyponum aduncum* p.p. Br. eur. fasc. 57—61, t. 24 (1854), et auct. var. SCHIMP. Synops. 606 (1860).

*Hyponum Sendtneri* SCHIMP. Bry. eur. Suppl. fasc. 3—4, t. 2 (1866), Synops. 2 ed. 730 (1876). MILDE Bry. Siles. 352 (1869). HOBK. Synops. 168 (1873). BOUL. Musc. Fr. 57 (1884). RENAULD in HUSN. Musc. gall. 373, t. 107 (1894). DIX. JAMES. Stud. Handb. 459 (1896).

*Amblystegium Sendtneri* DE NOT. Epil. 139 (1869).

*Hyponum aduncum*  $\epsilon$  *legitimum* SANIO Besch. der Harpidien 38 (1885).

Dioicous; in lax extensive tufts, yellowish-green or brownish above, ferruginous or brown at base. Stems 4—10 in. long, simple slender flexuose, pinnate, the branches patulous, incurved at apex. Leaves crowded, membranous, circinato-falcate and secund, broadly ovate at base, lanceolate with a long point, rather glossy, lightly striate when dry, excavate at the slightly decurrent angles; nerve rather strong, continued beyond middle; cells at base elongato-rectangular, narrower at margin, hyaline, at angles incrassate, subquadrate, orange-brown, upper cells linear vermicular. Perich. bracts numerous, outer smaller, patulous, inner appressed, elongato-lanceolate, sulcate, nerved to apex. Capsule on a long red seta, from an erect neck, cernuous or horizontal, oblongo-cylindric, subarcuate, contracted below mouth, irregularly sulcate; lid convex, apiculate, annulus broad, compound, teeth large orange with a hyaline border. Male infl. gemmiform, bracts ovate, acute, nerveless.

HAB.—Moorland bogs and marshes, not common. Fr. 6—7.

Amberley, Sussex (*Borrer* 1813, c. fr.). Marshes at Southport (*Wilson* 1858)!! Hale moss, Cheshire (*Wilson*). Above Bracklin falls, Callander (*Braithwaite*)!! Not uncommon on the moors of N. Yorkshire.

Var.  $\beta$ . *Wilsoni* (*Schimp.*) *Lindb.*

Plants 6—12 in. long, simple or remotely and irregularly pinnate, soft and slender. Leaves larger, more distant, prolonged into a filiform acumen, arcuate, basal angles smaller, less excavate, basal cells shorter and laxer.

SYN.—*Hyponum aduncum* Bry. eur. p.p.

*Hyponum Sendtneri*  $\beta$ . *Wilsoni* SCHIMP. Bry. eur. Suppl. fasc. 3—4, t. 3. Synops. 2 ed. 731. BOUL. Musc. Fr. 58.

*Amblystegium Wilsoni* LINDB. Musc. Scand. 33.

*Hyponum Wilsoni* RENAULD Rev. bryol. 1881, p. 75.

*Hyponum lycopodioides* \* *Wilsoni* RENAULD in HUSN. Musc. gall. 375.

*Hyponum aduncum*  $\delta$  *molle* SANIO Besch. Harp. 36.

HAB.—Ainsdale, Southport sands (*Wilson* 1858 c. fr.)!!

Sands of Barrie, Dundee (*Fergusson* 1871). Strensall Common, York (*Holt* 1886)!! Near Oxford (*Boswell* 1894)!! Shore of Loch Neagh (*Rev. H. W. Lett* 1886)!!



Var.  $\gamma$ . *hamatum* (Schimp.) Lindb.

Plants robust, more rigid, regularly pinnate, the branches patulous. Leaves denser, fuscous, elongated, circinate, cuspidato-acuminate, strongly nerved to apex.

SYN.—*Hynum aduncum* Var.  $\epsilon$  *hamatum* et  $\zeta$  *giganteum* SCHIMP. Bry. eur. fasc. 55—56, t. 25. Synops. 607.

*Hynum hamifolium* SCHIMP. Synops. 2 ed. 732.

*Amblystegium Wilsoni* Var. *hamatum* LINDB. Musc. scand. 33.

HAB.—Deep bogs, very rare.

Lough Neagh, Ireland (Rev. C. H. Waddell 1886)!! Pools at Castlethorpe, Northants (Dixon 1889)!!

This and the following 8 species constitute a most difficult group, as like most aquatics they are extremely variable. Two recent writers have made a special study of them, 1, Sanio in Bot. Centralblatt xiii, and Svenska vet. akad. Handl. x, in which the nine species are reduced to six, under which are placed a great number of varieties, subvarieties and forms and hybrids are also established. 2, Renauld in Husnot's Muscologia gallica, where nine species are maintained and a great many varieties, the whole described with great care and acumen. For the purposes of this work I have preferred the simpler arrangement of Schimper, and would merely point out that the leaf-cells and structure of the leaf-base are the parts most deserving attention.

### 23. *AMBLYSTEGIUM INTERMEDIUM* Lindb.

Dioicous; resembling *A. Sendtneri*, but more slender, pale green, vaguely pinnate. Leaves from ovate-oblong, lanceolate, not sulcate, the acumen flexuose and twisted, the cells very narrow and vermicular; lower perichæatial bracts numerous, squarrose. (T. XCIII, A.)

SYN.—*Hynum intermedium* LINDB. in HARTM. Skand. fl. 9 ed. 17 (1864). MILDE Bry. siles. 352 (1869). BOULAY Musc. Fr. 56 (1884). SANIO Besch. der Harpid. 57 (1885).

*Hynum Cossoni* SCHIMP. Bry. eur. Suppl. fasc. 3—4, t. 5 (1866), Synops. 2 ed. 730 (1876). HOBK. Synops. 2 ed. 217 (1884).

*Hynum revolvens* \* *Cossoni et intermedium* RENAULD in Rev. bryol. 1881, p. 79, et in HUSN. Musc. gall. 391 ut Var. (1894). DIX. JAMES. Stud. Handb. 465 (1896).

*Amblystegium intermedium* LINDB. Musc. Scand. 33 (1879).

Dioicous; pale yellowish green above, fuscous at base. Stems 3—10 in. high, flexuoso-erect, interruptedly pinnate, the branches very unequal. Leaves densely crowded toward apices, falcato-secund, from an ovate-oblong base slightly decurrent at angles, lanceolate, concave, not sulcate, with a short or long fine acumen, often flexuose or spirally

twisted; nerve vanishing below apex; cells at base quadrate, a row above and at basal angles rectangular, upward becoming linear, subflexuose and opaque. Perichætium large polyphyllous, outer bracts squarroso-patulous, upper erect, lanceolate, acutely acuminate, not plicate. Fruit as in *A. Sendtneri*.

HAB.—Bogs, not common. Fr. 6—7.

Spofforth, Yorkshire (*C. F. Wild* 1878)!! Strensall common, Yorkshire (*Holt* 1886)!! Southport (*Holt* 1881)!! Kinder Scout (*Holt*). Cong, Galway (*Moore*). Wilderley hill and Stapeley hill, Shropshire (*R. de G. Benson* 1892)!!

This moss appears to me sufficiently distinct from *revolvens*, and worthy to rank as a species in this closely allied group. *A. Cussoni* seems to be only a more robust form with more acuminate leaves. The cells of leaf are much narrower and longer than in *A. Sendtneri*.

#### 24. *AMBLYSTEGIUM REVOLVENS* (Sw.) De Not.

Autoicous; in large soft rufous or blackish purple tufts, irregularly branched. Leaves densely crowded, circinate, lanceolate, acuminate, not plicate, nerved beyond middle; cells very narrow, the angular few, elongate. (T. XCIII, B.)

SYN.—*Hypnum revolvens* SWARTZ Musc. suec. 38, t. 7, f. 14 (1799). SMITH Fl. brit. 1327 (1804), Eng. Bot. t. 2073. TURN. Musc. hib. 189 (1804). SCHWABG. Suppl. I, P. II, 299, t. 95? (1816). BRID. Mant. 180 (1819). FUNCK Moost. 67, t. 52 (1821). GREV. Mem. Vern. Soc. iii, 258. HUEBEN. Musc. germ. 604 (1833). C. MUELL. Synops. ii, 323 (1851). WILS. Bry. brit. 388 (1855). BR. SCH. Bry. eur. fasc. 57—61, p. 32, t. 21 (1854), Synops. 610 (1860), 2 ed. 736. BERK. Handb. 119, t. 10 (1863). MILDE Bry. siles. 353 (1869). HOBK. Synops. 169 (1873). BOUL. Musc. Fr. 55 (1884). LESQ. JAMES Moss. N. Amer. 384 (1884). HUSN. Musc. gall. 390 (1894). DIX. JAMES. Stud. Handb. 464 (1896).

*H. xerampelinum* VILL. Pl. Dauph. iii, 902.

*Hypnum aduncum* Var. *revolvens* WEB. MOHR Bot. Tasch. 361 (1807). BRID. Sp. musc. II, 223 (1812), Bry. univ. ii, 625 (1827). HOOK. TAYL. Musc. br. 111 (1818).

*Amblystegium revolvens* DE NOT. Epilogo 140 (1869).

*Hypnum intermedium*  $\beta$ . *revolvens* SANTO Beschr. Harpid. 58 (1885).

Autoicous; in large soft rufous-purple or blackish tufts. Stem weak, flexuoso-erect, fastigiate, branches distant, simple or sparingly subpinnate. Leaves circinate-falcate, very dense, from an ovate base, sublineal-lanceolate, tapering into a long slender acumen, not sulcate; nerve slender, vanishing at  $\frac{2}{3}$  length, cells very narrow, linear, vermicular, at angles few, lax, elongate, hyaline. Perich. bracts long, pale, lower ovate at base, erect with a filiform apiculus, recurved, nerveless, inner

elongate, acuminate, sulcate. Capsule on an erect neck, cernuous, oval-oblong, slightly incurved; annulus of 3 rows of cells, peristome as in *A. fluitans*. Male infl. with many ovate acuminate nerveless bracts.

HAB.—Moorland bogs and streamlets. Fruit rare 4—5.

A very pretty moss variable in color, sometimes of a golden green at apex with a metallic gloss, and remarkable for the very dense and beautifully circinate leaves, with a single row of elongated rectangular cells at base.

## 25. *AMBLYSTEGIUM LYCOPODIODES* (Neck.) De Not.

Dioicous; robust, subpinnate. Leaves crowded, falcato-secund, ovate-acuminate, concave, entire, nerved nearly to apex. Capsule oblong, cernuous. (T. XCIII, C.)

SYN.—*Hyßnum lycopodioides* NECK. Act. ac. Theod.—palat. ii, 453, t. 1, f. 2 (1770), Meth. musc. 168 (1771), Del. Gallo-belg. ii, 479 (1773). BRID. Sp. musc. II, 227 (1812), Mant. 180 (1819), Bry. univ. ii, 632 (1827). SCHWÆG. Suppl. I, P. II, 300. SCHULTZ Suppl. Fl. Starg. 82 (1819). FUNCK Moost. 66, t. 51 (1821). HUEBEN. Musc. germ. 699 (1833). RABENH. D. kr. fl. II, sect. 3, 269 (1848). C. MUELL. Synops. ii, 423 (1851). BR. SCH. Bry. eur. Fasc. 57—61, t. 31 (1854). WILS. Bry. brit. 390 (1855). SCHIMP. Synops. 607 (1860), 2 ed. 732. BERK. Handb. br. m. 118 (1863). MILDE Bry. siles. 350 (1869). HOBK. Synops. 169 (1873). BOUL. Musc. Fr. 51 (1884). LESQ. JAMES MOSS. N. Amer. 385 (1884). SANIO Besch. Harpid. 60 (1885). RENAULD in HUSN. Musc. gall. 374 (1894). DIX. JAMES. Stud. Handb. 460 (1896).

*Hyßnum scorpioides*  $\beta$ . minus WEB. Spic. Fl. goett. 67 (1778).

*Hyßnum diastrophyllum* LAMK. Fl. franc. i, 528 (1778).

*Hyßnum rugosum* SWARTZ Musc. suec. 57 (1769). SMITH Fl. brit. 1326 (1804) et Eng. Bot. t. 2250 p.p. WEB. MOHR Bot. Tasch. 362 (1807). ROEHL. Deutsch. fl. iii, 115 (1813).

*Hyßnum aduncum*  $\beta$ . *rugosum* HOOK. TAYL. Musc. brit. 111 (1818). GRAY Nat. arr. i, 765 (1821).

*Hyßnum aduncum*  $\gamma$ . *lycopodioides* SPRENG. (L.) Syst. veg. 16 ed. iv, 201 (1827).

*Amblystegium lycopodioides* DE NOT. Epilogo 138 (1869).

Dioicous; tall in deep soft tufts, pale yellowish brown above, fuscous-black at base. Stems 6—9 in. long, flexuoso-erect or decumbent, slender, dichotomous, subpinnate, the branches distant, turgid, with dense leaves, incurved at apex. Leaves crowded, falcato-secund, very large, ovate at base, broadly elongate-lanceolate, slightly decurrent, longly acuminate, flexuoso-sulcate and faintly rugulose when dry, entire, very concave; nerve slender, vanishing in acumen; upper cells linear acute, basal long, rectangular, bluntly angular, porose, angular a little dilated, subhexagonal. Perich. bracts imbricated, inner elongate, acuminate, many-sulcate, nerved. Capsule subcylindric, a little con-

tracted below the mouth, from an erect base, cernuous, fuscescent, lid mamillar; annulus broad; teeth long, pale with a hyaline border, processes cleft, cilia 3, remotely nodulose.

HAB.—Bogs and marshes, rare in fruit.

Near Forfar c. fr. (*Don* 1802). Prestwick Car, Northumberland c. fr. (*Thornhill*). St. Faith's bogs, Norwich and Yarmouth (*Turner*). Sands of Barry, Dundee (*Gardiner*). Pilmoor and Stockton Forest, York (*Spruce*). Strensall common, York, and banks of Seamer water (*Baker* 1856). Southport sands c. fr. (*Wilson* 1863)!! Howth, Dublin.

## 26. *AMBLYSTEGIUM VERNICOSUM* Lindb.

Dioicous; glossy yellowish-green. Stem erect, remotely pinnate-branched. Leaves falcato-secund, oblong-lanceolate, sulcate, not decurrent, nerve vanishing above middle, cells very narrow, vermicular, basal rufous, narrow oblong-quadrate. (T. XCIII, D.)

SYN.—*Hypnium pellucidum* WILS. MSS.

*Hypnium vernicosum* LINDB. in HARTM. Skand. Fl. 8 ed. 17 (1861). SCHIMP. Bry. eur. Suppl. fasc. 3—4, t. 4 (1866), Synops. 2 ed. 729 (1876). MILDE Bry. siles. 353 (1869). HOBK. Synops. 168 (1873). BOULAY Musc. Fr. 52 (1884). LESQ. JAMES Moss. N. Amer. 385 (1884). RENAULD in HUSN. Musc. gall. 389 (1894). DIX. JAMES. Handb. 464 (1896).

*Amblystegium vernicosum* LINDB. Musc. scand. 33 (1879).

*Hyp. lycopodioides*  $\beta$ , *vernicosum* SANIO Besch. 45 (1885).'

Dioicous; in large yellow-green shining tufts, sometimes golden-yellow or rufescent, fuscescent at base. Stems 4—6 in. high, erect, rigid, remotely pinnate, the branches patulous, somewhat hooked at apex. Leaves very glossy, secund, hamato-reflexed from middle, widely ovato-lanceolate, suddenly with a short slender recurved acumen, strongly sulcate, not decurrent nor auricled, nerved to a little above middle; cells narrowly vermicular, at base rufous, the lowest row chlorophyllose, rounded-quadrate, with the cuticular cells of stem attached, the two upper rows narrowly oblong-quadrate. Perich. bracts lanceolate, deeply sulcate, lower recurved at apex, upper straight, elongated, acutely acuminate, nerved. Capsule on a long seta, oblong, subarcuate, horizontal, contracted below the dilated mouth; lid mamillar, annulus broad, compound, peristome large, similar to that of *A. Kneiffii*. Male plants more slender with fewer branches.

HAB.—Marshy heaths and fields, not common. Fr. 6.



Amberley Wild Brook, Sussex (*Borrer* 1811). Wybunbury bog, Cheshire (*Wilson*)!!  
 Fouldon, Kincardine (*Sim* 1870). Auchinblae (*Hunt* 1871). Sutton Park (*Bagnall*).  
 Kinder Scout (*Holt*).

This moss was sent by Hedwig to Turner named *Hypnum aduncum*, and is well distinguished by the strongly sulcate leaves and basal cells. The fruit is very rare, but was found by Wilson on the famous Wybunbury bog.

Var. *β. majus* (*Lindb.*).

Plants robust, fuscous. Leaves larger, flexuose, narrowed into a very long attenuated acumen.

HAB.—Minton Beach, Longmynd, Shropshire (*R. de G. Benson* 1893)!!

## 27. *AMBLYSTEGIUM ADUNCUM* (L.) *Lindb.*

Autoicous; in glossy pale green tufts. Leaves long, broadly lanceolate, strongly plicate, falcato-secund, running into a subserrulate incurved subula. Caps. subarcuate, cylindraceous. (T. XCIV, A.)

SYN.—*Hypnum caule erectiusculo subramoso, foliis secundis recurvatis subulatis, ramulis recurvatis* L. Fl. suecica 320 (1745) excl. syn. Dill.

*Hypnum aduncum* L. Sp. plant. 1126 (1753) et Herbar.

*Hypnum uncinatum* HEDW. Musc. frond. iv, 65, t. 25 (1797). Sp. musc. 289 (1801). SWARTZ Musc. suec. 56 (1799). ROTH Fl. Germ. iii, 288 (1800). BRID. Musc. rec. II, P. II, 133 (1801). Sp. musc. II, 225 (1812). Mant. 180 (1819). Bry. univ. ii, 629 (1827). SMITH Fl. brit. 1328 (1804). Eng. Bot. t. 1600. TURN. Musc. hib. 190 (1804). SCHULTZ Fl. Starg. 326 (1806). ROEHL. Deutsch. Fl. iii, 115 (1813). SCHWAEGL. Suppl. I, P. II, 304 (1816). MART. Fl. cr. erl. 38 (1817). HOOK. TAYL. Musc. brit. 111 (1818). HOOK. Fl. scot. P. 2, 147 (1821). Br. Fl. ii, 94 (1833). FUNCK Moostasch. 67, t. 53 (1821). GRAY Nat. Arr. i, 765 (1821). HUEBEN. Musc. germ. 695 (1833). DE NOT. Syllab. 52 (1838). RABENH. D. kr. fl. II, S. 3, 275 (1848). C. MUELL. Synops. ii, 322 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 31, t. 20 (1854). WILS. Bry. br. 394 (1855). SCHIMP. Synops. 612 (1860), 2 ed. 739. BERK. Handb. 119 (1863). MILDE Bry. siles. 347 (1869). HOBK. Synops. 169 (1873). BOUL. Musc. Fr. 53 (1884). LESQ. JAMES MOSS. N. Amer. 382 (1884). SANIO Beschr. 18 (1885). HUSN. Musc. gall. 377 (1894). DIX. JAMES. Stud. Handb. 463 (1896).

*Amblystegium uncinatum* DE NOT. Epilogo 141 (1869).

*Amblystegium aduncum* LINDB. Musc. scand. 33 (1879).

Autoicous; in pale or dull yellowish-green tufts, tall or depressed. Stem suberect or prostrate, remotely pinnate, branches attenuate, falcato-incurved at apex. Leaves long, strongly falcato-secund, cauline broadly lanceolate, passing into a minutely serrulate incurved subula, slightly decurrent at angles, ramuline smaller and narrower, both strongly sulcate, rather rigid, with a thin nerve high into the point; cells very narrow, long and flexuose, laxer at base, few, rectangular and hyaline at angles. Perichætium very long, outer bracts recurved from middle, inner very long with a long filiform apiculus, sharply serrate at apex, thin-nerved, deeply sulcate. Capsule on a long purple seta,

incurvo-cernuous or suberect, subarcuate cylindraceous, contracted below mouth, orange-brown; annulus of 3 rows of cells; peristome yellowish, processes entire.

HAB.—Damp stony places and banks in subalpine districts. Fr. 6.

Four sheets of specimens are in the Linnean herbarium which consist entirely of this species, and are named *aduncum* in Linnæus's own handwriting, so that there cannot be a doubt that this is what he intended to be the type, and seeing how many different mosses have passed under the name of *aduncum*, it will greatly simplify the nomenclature to restore the name to its rightful owner. It adorns the tops of old walls with its neat glossy tufts in many northern glens, *e.g.*, the south side of Loch Tay—Glen Fender, &c., and in a sterile state ascends as high as the summit of Ben Lawers, nearly 4,000 ft.

Var. *β. plumulosum* Br. Sch.

Small, slender, intricate and prostrate, with denser branches. Leaves much smaller, less acuminate, scarcely at all serrulate. Capsule smaller.

SYN.—*Leskea Deinbollii* SWARTZ MSS.

*Hyp. contiguum* NEES in HUEBEN. Musc. germ. 676. MILDE Bry. siles. 347.

*Hypnum uncinatum* Var. *plumulosum* Br. Sch. Bry. eur.

HAB.—Trunks of trees and mountain districts, not common. Snowdon (*Dixon*). Hebden Bridge, Yorkshire (*Needham* 1897)!! Glen Fender, Blair Athol (*Braithwaite*).

## 28. *AMBLYSTEGIUM EXANNULATUM* (Guemb.) De Not.

Dioicous; slender, elongated, incurved at apex, pinnate-branched, often purplish. Leaves falcate, elongate lanceolate, slightly sulcate, cells very narrow, vermicular, at base oblongo-rhombic, at the auriculate angles inflated, hyaline. Capsule cylindraceous oblong, erect or incurved. (T. XCIV, B.)

SYN.—*Muscus palustris terrestri similis, foliolis crassis obscure virentibus, mucronibus aduncis unam partem spectantibus*. RAY Synops. 2 ed. 38, n. 13 (1696).

*Hypnum palustre erectum, summitatibus aduncis*. DILL. in RAY Synops. 3 ed. p. 82, n. 15 (1724), Hist. musc. 292, t. 37, fig. 26 (1741).

*Hypnum aduncum* HUDS. Fl. angl. 424 (1762). SWARTZ Musc. suec. 56 (1799). WEB. MOHR Bot. Tasch. 360 (1807). HUEBEN. Musc. germ. 693 (1833). WILS. Bry. brit. 381 (1855). BERK. Handb. br. m. 120 (1863). HOBK. Synops. 167 (1873).

*Hypnum exannulatum* GUEMB. Bry. eur. fasc. 57—61, p. 34, t. 23 (1854). SCHIMP. Synops. 608 (1860), 2 ed. 733. MILDE Bry. siles. 349 (1869). HOBK. Synops. 2 ed. 217 (1884).

*Amblystegium exannulatum* DE NOT. Epilogo 142 (1869).

*Hyßnum fluitans* Var. *exannulatum* SANIO Besch. Harpid. 8 (1885). RENAULD in HUSN. Musc. gall. 384 (1894). DIX. JAMES. Stud. Handb. 462 (1896).

Dioicous; yellowish-green or purplish, the stems slender, elongated, erect or procumbent, pinnate, the branches circinato-incurved at apex. Leaves crowded, glossy, uncinatè, secund, elongato-lanceolate, slenderly acuminate, concave, not sulcate or slightly so when dry, margin at base minutely serrate, remotely denticulate above, nerve subterete, reaching nearly to apex; cells very narrow vermicular, those of the auriculate angles rectangular, inflato-dilated, hyaline, in mid-base oblongo-rhombic, lax, pachydermous, pale yellow. Perichætium elongate, bracts with a slender nerve, not sulcate. Capsule erecto-incurved, cylindraceous-oblong, lid convex-conic, annulus none.

HAB.—Pools and boggy fields in subalpine places. Fr. 5.

Var. *ß. purpurascens* Schimpf.

In deep tufts, closely pinnate, soft, purple or variegated with green. Leaves shorter with shorter cells, nerve stout.

SYN.—*Hyßnum Hookeri* TURNER MS.

*Hyß. exannulatum* *ß. purpurascens* SCHIMP. Synops. 2 ed. 734. DIX. JAMES. Stud. Handb. 462.

*Amblystegium fluitans* *γ. alpicolum* DE NOT. Epilogo 143.

HAB.—Bogs in the mountains.

Ben Nevis (*Borrer* 1810)! Ballycheulish, Ireland (*Turner*). Glen Lyon (*Dr. B. White* 1865). Fish Pool, Cheshire (*Holt* 1883)! !

Var. *γ. Rotæ* De Not.

In fine purple immersed tufts. Stem densely and interruptedly ramulose, elongated. Leaves long, straight, narrowly elongate-lanceolate, piliform-attenuated, secund at apex of branches: nerve reaching point or excurrent; cells very long and narrow.

SYN.—*Hyßnum exannulatum dichelymoides* PFEFFER Musc. Rhæt. exs. et in Bryol. Reisegebild. 35.

*Amblystegium Rotæ* DE NOT. Epilogo 144.

*Hyßnum stenophyllum* WILS. MSS.

*Hyß. exannulatum* *γ Rotæ* SCHIMP. Synops. 2 ed. 734.

*Hyß. fluitans* Var. *stenophyllum* SCHIMP. Synops. 610. BOULAY Musc. Fr. 63.

HAB.—In deep pools; not common.

Hale moss, Cheshire (*Wilson* 1856)!

Var. *δ. acutum* Sanio.

Dull yellow-green, rigid, erect, irregularly pinnate with very short branches. Leaves ovato-lanceolate, acute dimorphous, auricles of large hyaline cells, upper very short dense and opaque.

SYN.—*Hypnum fluitans exannulatum acutum assimile* SANIO Beschreib. 12.

HAB.—Ben Lawers (*Hunt* 1865, *Holt* 1880)!!

Var  $\epsilon$ . *brachydictyon* RENAULD.

Plants green, pinnate, the upper leaves short, firm, feebly secund, oval at base, often slightly sulcate, ending in a broad short acumen; nerve stout, middle cells short, oblong-sublinear, those of the large auricles numerous, dilated.

SYN.—*Hypnum fluitans*  $\theta$ . *alpinum* RENAULD in Rev. bryol. 1881, p. 78.

*Hyp. fluitans* Var. *brachydictyon* RENAULD in HUSN. Musc. gall. 385.

HAB.—Quiraing, Skye ♂ (*Dixon* 1893)!!

This moss is indeed very close to *H. fluitans*, and except the dioicous position of the inflorescence, and the different form and structure of the leaf-base, it would have to be united with the latter. A great many varieties and forms have been placed under each, the number of which will no doubt be extended by the attention of collectors. The variety *brachydictyon* is well marked and an interesting addition to our Flora.

## 29. AMBLYSTEGIUM FLUITANS (L.) De Not.

Autoicous; lax, submersed, pinnate. Leaves lanceolate, not sulcate, longly acuminate, slightly falcate towards summit, basal angular cells hyaline inflated. Capsule oblong, incurved. (T. XCIV, C.)

SYN.—*Hypnum fluitans, foliis tenuissimis, capsulis exilibus* DILL. Hist. musc. 546, t. 83, f. 7, (1741), et Herbar.

*Hypnum fluitans* L. Fl. suec. 2 ed. 399 (1752). WEISS Cr. Goett. 226 (1770). NECK. Meth. musc. 285 (1771). WITHER. Bot. Arr. ii, 683 (1776). RELHAN Fl. cant. Suppl. 20 (1786). ROTH Fl. germ. i, 466 (1788). SIBTH. Fl. oxon. 298 (1794). HOFFM. Deutsch. Fl. ii, 78 (1795). HEDW. Musc. fr. iv, 94, t. 36 (1797). Sp. musc. 296 (1801). HULL Brit. Fl. P. 2, 279 (1799). SWARTZ Musc. suec. 57 (1799). BRID. Musc. rec. II, P. II, 182 (1801). Sp. musc. II, 224 (1812). Mant. 180 (1819). Bry. univ. ii, 626 (1827). SMITH Fl. brit. 1319 (1804). Eng. Bot. t. 1448. TURN. Musc. hib. 182 (1804). P. BEAUV. Prodr. 64 (1805). SCHULTZ Fl. starg. 337 (1806). WEB. MOHR Bot. Tasch. 358 (1807). WAHLENB. Fl. lapp. 378 (1812). SCHWABG. Suppl. I, P. II, 304 (1816). MART. Fl. cr. erl. 39 (1817). HOOK. TAYL. Musc. br. 98 (1818). HOOK. Fl. Scot. P. 2, 147 (1821). Br. Flora ii, 93 (1833). FUNCK Moost. 67, t. 53 (1821). GRAY Nat. arr. i, 756 (1821). HUEBEN. Musc. germ. 696 (1833). DE NOT. Syllab. 52 (1838). RABENH. D. kr. fl. II, S. 3, 268 (1848). C. MUELL. Synops. ii, 323 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 33, t. 22 (1854). WILS. Bry. brit. 387 (1855). SCHIMP. Synops. 609 (1860), 2 ed. 734. BERK. Handb. br. m. 118, t. 10 (1863). MILDE Bry. siles. 348 (1869). HOBK. Synops. 169 (1873). BOULAY Musc. Fr. 62 (1884). LESQ. JAMES Moss. N. Amer. 383 (1884). RENAULD in HUSN. Musc. gall. 379 (1894). DIX. JAMES. Stud. Handb. 461 (1896).

*Amblystegium fluitans* DE NOT. Epilogo 143 (1869).



Autoicous; in large submersed or floating tufts, soft, lax, yellowish-green or brownish with a silky gloss. Stems long slender, repeatedly dichotomous, densely or laxly pinnate. Cauline leaves remote, flexuoso-patulous, only the apical hooked, elongate-lanceolate, narrow at base, gradually tapering into a long and very fine acumen, faintly denticulate at base and apex; ramuline narrower, secund or rarely falcate, all nerved nearly to apex, concave, not sulcate; cells very narrow and thin, long and rhomboid, hyaline and dilated at subdecurent angles. Perichæatial bracts closely imbricated, nerved, not sulcate, innermost long and narrowly acuminate. Capsule on a very long seta, from an erect base, oblong, incurved, soft, ferruginous brown; annulus none, peristome teeth short, lanceolate-subulate, yellowish with a hyaline border, processes entire, cilia smooth, often imperfect. Male infl. numerous.

HAB.—Pools and bogs, common. Fr. 6—7.

Var.  $\beta$ . *submersum* Schimp.

Stems very long, 6—12 in., floating in deep water, in soft pale green tufts, with few short branches. Leaves distant, secund, falcate or patulous, broadly oblong-lanceolate; nerved to  $\frac{3}{4}$  length, the acumen shorter, serrate at apex, basal cells lax to the nerve, but little dilated, hyaline.

SYN.—*Hynum fluitans* Var. *submersum* SCHIMP. Bry. eur. REN. in HUSN. Musc. gall. 382.

*Hyp. fluitans*  $\delta$ . *amphibium* f. *submersum* SANIO Bechreib. 57.

HAB.—In deep pools on heaths.

Var.  $\gamma$ . *Jeanbernati* Renauld.

In pale green tufts; leaves slightly secund, oblong-lanceolate, shortly acuminate, obsoletely denticulate, nerved for  $\frac{2}{3}$  the length; upper cells very long, the angular but little dilated.

SYN.—*Hynum fluitans* Var. *Jeanbernati* REN. Revis. de la sect. *Harpidium*, et in HUSN. Musc. gall. 380.

HAB.—Whernside, Yorks. (Dixon 1896) !!

A tall slender form of a bright green colour, and remarkable for the short broad acumen, but having the narrow linear base to the leaf as in typical *fluitans*.

Var.  $\delta$ . *paludosum* Sanio.

Stems elongated, slender, pale green above, fuscous below; pinnate with short acute arched branches; leaves lax subsecund, curved or falcate, oblongo- or lineal-lanceolate, with a very long flexuose slender acumen, hyaline cells large, reaching nerve.

SYN.—*Hypnum fluitans*  $\delta$ . *amphibium* c. *paludosum* SANIO Beschreib. Harpidien 14.

HAB.—Abbots moss, Cheshire (*Holt* 1887)!!

Var.  $\epsilon$ . *Arnellii* Sanio.

Floating, laxly tufted, glossy, yellow-green above, fuscous below, pinnate with short divergent branches; leaves falcate, oblong-lanceolate, with very long attenuated points, serrulate, basal cells rectangular, hyaline, incrassate, upper narrow, much elongated.

SYN.—*Hypnum fluitans*  $\delta$ . *amphibium* h. *Arnellii pallens* SANIO.

HAB.—Strensall Common, York (*Holt* 1886)!!

A closely-allied form—*pseudoalpinum* Sanio—with long nearly simple dense-leaved stems, fuscous-black for the greater part of their length, is found by Mr. Holt on Abbots moss.

Var.  $\zeta$ . *falcatum* Schimpf.

In yellowish tufts, ferruginous at base, simple or with few branches; leaves dense dimorphous, falcato-recurved, lower lanceolate, upper oblong-lanceolate, with a subulate acumen, involute below.

SYN.—*Hypnum fluitans* Var. *falcatum* Bry. eur. BOUL. Musc. Fr. 63. REN. in HUSN. Musc. gall. 383.

HAB.—Abbots moss (*Holt* 1887)!! the form *alpinum* of Sanio.

Var.  $\eta$ . *Holtii* Sanio.

Stems elongated, floating, yellowish-green at apex, rufescent below, not glossy, pinnate with numerous very short erect branches. Leaves erectopatent, lanceolate, slightly auricled, extended into a very long, flexuose subulate acumen, cells laxer, all margin remotely denticulate.

SYN.—*H. fluitans anglicum homophyllum Holtii* SANIO.

HAB.—Abbots moss, Cheshire (*Holt* 1887)!!

This variety both in habit and leaf-form is quite striking, and I am pleased to associate it with one who has done so much to supply me with forms of this most difficult group, which may easily be doubled if we carry out the subdivision according to Sanio's arrangement, which cannot be properly studied without type-specimens of the various forms.

### 30. *AMBLYSTEGIUM KNEIFFII* Schimpf.

Dioicous; stem erect, irregularly branched or pinnate. Leaves distant subsecund, falcate, ovato-lanceolate, acuminate, entire, nerve  $\frac{2}{3}$  the length; cells dilated at basal angles; perich. bracts elongated, sulcate. Capsule subcylindric, curved, cernuous. (T. XCIV, D.)

SYN.—*Muscus palustris valde ramosus surculis erectioribus, foliolis in tenues et longos mucrones productis* RAY Synops. 2 ed. 39, n. 14 (1696).

*Hypnum erectum aut fluitans aquaticum, foliis oblongis perangustis acutis* DILL. Cat. Giss. 219 (1718), in RAY Synops. 3 ed. 82 (1724). Hist. musc. 299, t. 38, f. 33 (1741), et Herb.

*Hypnum aduncum* (non L.) HEDW. Musc. frond. iv, 62, t. 24 (1797), et Herbar. fide Schimper. SCHIMP. Bry. eur. Suppl. fasc. 3—4, t. 1 (1866). BOUL. Musc. Fr. 59 (1884). HOBK. Synops. 2 ed. 216 (1884).

*Hypnum riparium* p.p. C. MUELL. Synop. ii, 321 (1851).

*Amblystegium Kneiffii* SCHIMP. Bry. eur. fasc. 55—56, p. 17, t. 11 (1853). DE NOT. Cronaca Briol. Ital. P. II, 24 (1867), Epilogo 145 (1869).

*Hypnum Kneiffii* SCHIMP. Coroll. 135. WILS. Bry. brit. 390 (1855). SCHIMP. Synops. 605 (1860). BERK. Handb. br. m. 116 (1863). MILDE Bry. siles. 351 (1869). HOBK. Synops. 167 (1873).

*Hypnum aduncum* Var. *Kneiffii* SCHIMP. Suppl. l.c., Synops. 2 ed. 727 (1876). LESQ. JAMES MOSS. N. Amer. 380 (1884). RENAULD in HUSN. Musc. gall. 370 (1894). DIX. JAMES. Stud. Handb. 458 (1896).

Dioicous; in soft yellowish-green tufts. Stems slender, erect or ascending, irregularly pinnate. Leaves rather distant, patulous and subsecund, more or less falcate at apex, from a broadly ovate base, lanceolate acuminate, not sulcate, excavate and decurrent at basal angles, nerved to middle; cells at base lax, hexagono-rectangular, those at angles dilated, hyaline, the upper narrow, hexagono-rhomboid; nerve  $\frac{1}{2}$ — $\frac{3}{4}$  length of leaf. Perich. bracts patulous, small and oval externally, the inner large, erect, long and acuminate, strongly plicate, with a long thin nerve nearly to apex. Capsule on a long flexuose seta, from an erect neck, inclined, oblong, arcuate, pale ferruginous, lid conic, annulus broad, peristome as in *A. fluitans*.

HAB.—Marshes and pools, frequent. Fr. 6—7.

#### Var. *β. gracilescens* Schimp.

In soft yellowish or lively green tufts. Stem slender erect, sparingly divided, pinnate. Leaves small, patenti-secund, falcate, from a subcordate ovate base, narrowly lanceolate, suddenly narrowed into a long flexuose acumen, nerved beyond middle; basal cells rather lax, hexagono-rectangular.

SYN.—*Hypnum aduncum β. gracilescens* Bry. eur. fasc. 57—61, p. 37, t. 24<sup>1</sup>. SCHIMP. Synops. 606, 2 ed. 728.

HAB.—In subalpine bogs, rare.

#### Var. *γ. tenue* Schimp.

In loose tufts, dull yellow-green above, pale brown below; stems slender, more or less pinnate with short branches. Leaves distant, very small, broad at base, with large hyaline auricles for  $\frac{2}{3}$  the width of each wing, suddenly contracted into a short falcato-circinate incurved acute acumen; nerve reaching  $\frac{1}{3}$ — $\frac{1}{2}$  the length; cells shorter.

SYN.—*Hypnum aduncum δ. tenue* SCHIMP. Bry. eur. l, c, et Synops. RENAULD in HUSN. Musc. gall. 369.

HAB.—Southport (*Holt* 1881) !!

Very distinct as a variety and readily known by the short falcate leaves, with short cells and nerve.

Var. *δ. intermedium* Schimp.

Submersed, yellowish-green; stems elongated, sparingly and irregularly pinnate. Leaves very variable, oblong-ovate, lanceolate, cuspidate, scarcely secund, nerved above half-way; the ramuline subfalcate, ovate, shortly acuminate; median cells very long, linear.

SYN.—*Hynum aduncum* Var. *intermedium* SCHIMP. Synops. 2 ed. 727. Bry. eur. Suppl. fasc. 3--4, t. 1, B 1--8. SANIO Besch. Harpid. 27.

HAB.—Strensall common, York (*Holt* 1886)!! Southport and Hale moss (*Holt* 1882) !! a very lax form.

Var. *ε. polycarpon* Bland.

Stems procumbent, with numerous slender branches, vaguely ramulose. Leaves patent or erect, or subsecund, rather distant, falcato-secund at apex, broadly ovate at base, lanceolate, cuspidate, nerved to or beyond middle, median cells very long and linear, suprabasal lax, quadrate.

SYN.—*Hynum polycarpon* BLANDOW in STURM Deutsch. Fl. Crypt. fasc. 14. HUEBEN. Musc. germ. 690.

*Hyf. aduncum* Var. *polycarpon* SCHIMP. Bry. eur. et Synops. SANIO, RENAULD, &c.

HAB.—Henfield Level, Sussex (*Mitten*).

Var. *ζ. pungens* H. Muell.

Stems divided into simple branches or slightly ramulose, the apical leaves convolute in a long cuspidate point, the lower ovato-lanceolate, patent, upper ovate, acutely cuspidate, subimbricated, nerve  $\frac{3}{4}$  length of leaf, basal cells but little dilated, upper long and linear.

SYN.—*Hyf. Kneiffii* *δ. pungens* H. MUELL. in MILDE Bry. siles. 351.

*Hyf. aduncum* Var. *pungens* SANIO, RENAULD, &c.

HAB.—Pits near Knutsford, Cheshire (*Holt* 1895) !!

Var. *η. pseudofontanum* Sanio.

Stems elongated, very slender, floating, pinnate with very short branches or nearly simple. Leaves falcato-secund at apex, cauline leaves distant, patent, flexuose, denticulate at margin, from an ovate base, lanceolate and extended into a very long slender twisted acumen, or very narrowly lanceolate-acuminate; nerve  $\frac{3}{4}$  length of leaf, basal cells rectangular, lax and incrassate.

HAB.—Oakmere, Cheshire (*Holt* 1887) !!

Var. *θ. paternum* Sanio.

Stems elongated, rather rigid, dull yellowish-green, growing in deep water, pinnate with short acute branches. Leaves remote, erect or patent, the apical convolute in a point, oblong-lanceolate, gradually narrowed into a long acute acumen, nerve  $\frac{1}{2}$  the length, angular cells occupying nearly all the base.

HAB.—Strensall common, York (*Holt* 1886) !!

In concluding this most protean group, I have availed myself largely of the writings of Sanio, who has elaborated the group with the greatest acumen, but I have not accepted his minute sub-division of the forms, for without type specimens it would only be a hindrance to students to employ four or five names to each form. I have no doubt these will be largely augmented by a close investigation of each locality, coupled with the amount of rainfall, nature of subsoil, and variability of season. I look upon the cell structure of the base and angles of leaf, with the presence of plicæ in leaves and perichæatial bracts as of prime importance and I consider that the dioicous or autoicous arrangement of the inflorescence to be not a matter of indifference in these or any other mosses.

Sect. 4. SCORPIDIUM *Schimp.* Plants tall, branches erect, fastigate, with few ramuli. Leaves turgidly secund-imbricate, broad, obtuse, soft, nearly nerveless, with very narrow cells.

### 31. AMBLYSTEGIUM SCORPIOIDES (L.) Lindb.

Dioicous; in lax rufous or black tufts, erect or procumbent, irregularly pinnate. Leaves dense, imbricated, secund, ovate-oblong, shortly acuminate; the margins incurved; nerve faint, single or double. Capsule oblong-cylindraceous, arcuate. (T. XCVII, C.)

SYN.—*Hypnum scorpioides palustre magnum Lycopodii instar sparsum* DILL. Hist. musc. 290, t. 37, f. 25 (1741) et Herbar.

*Hypnum scorpioides* L. Sp. plant. 1127 (1753). HUDS. Fl. angl. 424 (1762). WITHER. Bot. arr. ii, 686 (1776). LIGHTF. Fl. scot. ii, 754 (1777). RELH. Fl. cant. 412 (1785). ROTH Tent. fl. germ. i, 469 (1788). HOFFM. Deutsch. fl. ii, 63 (1795). SWARTZ Musc. succ. 58 (1799). ABBOT Fl. Bedf. 249 (1798). HULL Br. fl. p. 2, 271 (1799). HEDW. Sp. musc. 295 (1801). SMITH Fl. brit. 1326 (1804). Eng. Bot. t. 1039. TURN. Musc. hib. 187 (1804). SCHULTZ Fl. Starg. 328 (1806). WEB. MOHR Bot. Tasch. 372 (1807). ROEHL. Deutsch. fl. iii, 117 (1813). BRID. Sp. musc. II, 209 (1812), Mant. 191 (1819), Bry. univ. ii, 637 (1827). SCHWAEGL. Suppl. I, P. II, 293 (1816). HOOK. TAYL. Musc. brit. 112 (1818). HOOK. Fl. scot. P. 2, 148 (1821). GRAY Nat. arr. i, 765 (1821). HUEBEN. Musc. germ. 697 (1833). DE NOT. Syllab. 48 (1838), Epilogo 169 (1869). RABENH. D. kr. fl. II, S. 3, 269 (1848). C. MUELL. Synops. ii, 418 (1851). SCHIMP. Bry. eur. fasc. 57—61, p. 44, t. 30 (1854), Synops. 650 (1860), 2 ed. 796. WILS. Bry. brit. 400 (1855). BERK. Handb. 127, t. 11, f. 5 (1863). MILDE Bry. siles. 350 (1869). HOBK. Synops. 180 (1873). BOULAY Musc. Fr. 19 (1884). LESQ. JAMES MOSS. N. Amer. 406 (1884). HUSN. Musc. gall. 393 (1894). DIX. JAMES. Stud. Handb. 486 (1896).

*Hypnum squarrosus* TIMM Fl. megap. 827 (1788).

*Hyp. lycopodioides*  $\beta$ . NECK, Meth. musc. 168 (1771).



*Hyp. crassum* SCHUM. Pl. Sael. ii, 84.

*Hyp. fuscum* SCHLEICH.

*Amblystegium scorpioides* LINDB. musc. scand. 33 (1879).

Dioicous; in large soft blackish-green or rufous and black tufts. Plants tall, procumbent or ascending, dichotomous, with few distant unequal ramuli, arcuato-incurved at apex, turgidly leafy, olivaceous-green, rufous-purple or blackish. Leaves crowded, secund, imbricated, here and there falcate, from a narrow base, broadly ovate or ovate-oblong, shortly acuminate, concave with the wings incurved to apex, rugose and undulated when dry; nerve very short, faint, single or double; cells long, very narrow and linear, slightly dilated and rectangular at insertion, but without any distinct angular cells. Perichætium elongated, laxly imbricated, bracts acutely acuminate, many-sulcate, with a thin nerve; vaginula long, slightly pilose, seta long, purple; capsule oblongo-cylindric, arcuate, sulcate, constricted below the mouth, lid convex-conic, annulus broad; peristome pale yellow, cilia 2—3.

HAB.—Spongy alpine bogs, not uncommon. Fr. 6—7, rare.

Malham tarn c. fr. (*Nowell*). Wybunbury bog c. fr. (*Wilson*)!! Bowness c. fr. (*Barnes* 1864).

Sect. 5. HYGROHYPNUM *Lindb.* Plants prostrate or depressed, with irregular ascending branches. Leaves ovato-lanceolate to orbicular, rarely patent, subsecund or decurved, nerve slender, generally unequally forked; cells linear, very narrow. Capsule turgid ovate or oblong, incurvobaccinate.

Schimper's name *Limnobium* cannot be retained for this group, as it was already in use for a genus of Hydrocharidaceæ (*RICHARD* in *Mém. Inst.* ii, 66—1811).

The species form a very natural section, but some are very closely allied and difficult to distinguish from each other.

#### CLAVIS TO THE SPECIES.

Leaves oval or circular, obtuse.

Nerve single, sometimes cleft, reaching above middle.

—— short, forked.

*Smithii*.

Leaves oval-suborbicular, subsecund at apex.

*dilatatum*.  
*molle*.

—— oval, narrowed toward point, erecto-patent.

—— oblong-lanceolate, acuminate.

Dioicous; perich. bracts not plicate.

*ochraceum*.

Autoicous; perich. bracts plicate.

Nerve long, single, basal angles not excavate or auricled.

*palustre*.

—— none, or short faint and bifurcate, basal angles excavate, of orange cells forming auricles.

*eugyrium*.

32. **AMBLYSTEGIUM SMITHII** (Swartz) Lindb.

Autoicous; in rigid olivaceous-green tufts; branches erect or procumbent, simple. Leaves patent, roundish with an obtuse point, entire; nerve simple or forked, reaching beyond middle; cells very narrow, not dilated at angles. Capsule small, suberect, ovate. (T. XCV, A.)

SYN.—*Leskea Smithii* SWARTZ in LILJEBL. Svensk Fl. 3 ed. 549 (1816). HARTM. Skand. fl. 10 ed. (1871).

*Hypnum arcticum* SOMMERF. Suppl. Fl. lap. 65, t. 2 (1826). HARTM. Skand. fl. 9 ed. C. MUELL. Synops. ii, 432 excl. syn. (1851). WILS. Bry. br. 372 (1855). SCHIMP. Synops. 638 (1860), 2 ed. 779. BERK. Handb. br. m. 104, t. 7 (1863). MILDE Bry. siles. 374 (1869). HOOK. Synops. 177 (1873). BOUL. Musc. fr. 22 (1884). LESQ. JAMES MOSS. N. Amer. 400 (1884). HUSN. Musc. gall. 414, t. 120 (1894). DIX. JAMES. Stud. Handb. 484 (1896).

*Hypnum alpestre* GREV. Scott. cr. fl. t. 282 (1828). (non Swartz, Wahlenberg nec Hedwig). HOOK. Br. fl. ii, 79 (1833).

*Limnium arcticum* BR. SCH. Bry. eur. fasc. 55—56, 6, t. 5 (1853). DE NOT. Epilogo 160 (1869).

*Stereodon arcticus* MITT. in Journ. Linn. soc. viii, 42 (1864).

*Amblystegium Smithii* LINDB. Musc. scand. 33 (1879).

Autoicous; in lax rigid tufts, olivaceous-green or blackish. Stems slender, naked below, horny, sparingly branched, without radicles, branches simple obtuse. Leaves scariose, small, patent, ovato-rotundate, shortly and bluntly acuminate, entire or very minutely serrulate, plano-concave; nerve strong, reaching half-way or more, often forked, cells short and narrow, flexuose, not dilated at basal angles, a single marginal row minute, subquadrate. Inner perich. bracts elongate-lanceolate, serrate at margin, hardly sulcate, with a long nerve. Capsule small, suberect or cernuous, with a distinct neck, oval, arcuate when dry, not contracted below mouth, dark brown; lid mamillar, annulus of two rows of cells; teeth of peristome short, yellow, endostome pale, with short cilia.

HAB.—Stones in mountain streams, not common. Fr. 6—7.

Breadalbane range, Ben Lawers, generally fruiting freely (*Lyon*)!! Ben Challum (*Greville*). Clova mountains (*Croall*)!! Canlochan (*Hunt* 1868)!!

*H. Goulardi* SCHIMP. is a slender, lax variety of this species.

33. **AMBLYSTEGIUM DILATATUM** (Wils.) Lindb.

Autoicous; bright green, with a rufous tint, rigid. Leaves subsecund, suborbicular with a rounded obtuse point, cells very long

and narrow, nerve very short, forked. Capsule oblong, horizontal. (T. XCV, C.)

SYN.—*Hyponum molle* p.p. C. MUELL. Synops. ii, 431 (1851). WILS. Bry. brit. 371 (1855). SCHIMP. Synops. 637 (1860). BERK. Handb. 104 t. 7, f. 2 (1863).

*Limnobia molle* BR. SCH. Bry. eur. fasc. 55—56, 5, t. 4 (1853). DE NOT. Epilogo 159 (1869).

*Hyponum dilatatum* WILS. MS. HUNT in Trans. Lit. Phil. soc. Manchester 1869, p. 320. HOBK. Synops. 176 (1873). SCHIMP. Synops. 2 ed. 776 (1876). HUSN. Musc. gall. 413, t. 119 (1894).

*Hyponum molle* Var. *dilatatum* BOUL. Musc. Fr. 25 (1884). DIX. JAMES. Stud. Handb. 483 (1896).

*Amblystegium dilatatum* LINDB. Musc. scand. 33 (1879).

Autoicous; in lax depressed tufts, soft when moist, somewhat rigid when dry, rather glossy, yellowish green variegated with rufous. Stems at base slender prostrate and denuded of leaves, repeatedly divided, branches erect, simple. Leaves patulous, dense, subsecund, from a very narrow base, slightly decurrent at angles, suborbicular, obtuse or suddenly with a short apiculus, plano-concave, obsoletely serrate at point; nerve very short and forked or obsolete; cells very narrow, subvermicular-linear, at basal angles subhexagonal. Perich. bracts loosely sheathing, soft, plicate, nerveless. Capsule on a short purple seta, oblong, arcuato-cylindric when old, contracted below mouth, lid convex-conic, annulus narrow, peristome large, with long orange teeth.

HAB.—Stones in alpine streams. Fr. 7.

Loch Brandy stream, Clova (*Gardiner* 1842)!! Aber stream, N. Wales (*Nowell* 1861)!! Glen Dole, Clova (*Fergusson*). Cautley waterfall, Sedbergh, Yorks. Torc waterfall, Killarney (*Capt. Hutton* 1865).

### 34. *AMBLYSTEGIUM MOLLE* (*Dicks.*) *Lindb.*

Autoicous; in very soft lax dull green tufts. Stems long, slender, nearly simple. Leaves patent, elliptic-oval, acuminate; nerve cleft, reaching middle; cells shorter, linear-fusiform. Capsule incurvo-cernuous. (T. XCV, B.)

SYN.—*Hyponum molle* DICKS. Crypt. fasc. II, 11, t. 5, f. 8 (1790). WITHER. Bot. arr. 3 ed. iii, 862 (1796). HULL Br. fl. P. 2, 273 (1799). HEDW. Sp. musc. 273, t. 70, f. 7—10 (1801). BRID. Musc. rec. II, P. II, 178 (1801), Sp. musc. II, 129 (1812), Mant. 162 (1819), Bry. univ. ii, 570 (1827). SMITH Fl. brit. 1312 (1804), Eng. Bot. t. 1992. WEB. MOHR Bot. Tasch. 340 (1807). ROEHL. Deutsch. fl. iii, 220 (1813). SCHWAEGL. Suppl. I, P. II, 220 (1816). HOOK. TAYL. Musc. br. 95 (1818). HOOK. Fl. scot. P. 2, 142 (1821), Br. fl. ii, 78 (1833). FUNCK Moostasch. 58, t. 40 (1821). GREV. Scott. cr. fl. t. 283 (1828). HUEBEN. Musc. germ. 629 (1833). WILS. Bry. br. 371, p.p. (1855). HOBK. Synops. 176 (1873). BOULAY Musc. Fr. 23 (1884). SCHIMP. Synops. 2 ed. 775 (1876). HUSN. Musc. gall. 412, t. 119 (1894). DIX. JAMES. Stud. Handb. 482 (1896).

*Amblystegium molle* LINDB. Musc. scand. 33 (1879).

Autoicous; dull green, in very soft loose tufts. Stems long, slender, without radicles, naked at base, simple or but little branched, readily falling asunder. Leaves patent on all sides, very soft, not glossy, elliptic-oval, contracted at insertion, gradually narrowed to an acute or muticous point, feebly serrulate at apex; nerve cleft or split into 3—5 unequal divisions, the longest reaching middle; cells thinner, shorter, linear-fusiform, short at apex, at slightly auriculate angles quadrate with orange walls. Lower perich. bracts patulous from middle, inner erect, broad, elongate, gradually acuminate, serrulate at apex, nerveless, not sulcate. Capsule on a short seta, turgid oval, incurvo-cernuous, annulus very broad. Male infl. numerous, thick, ovate, bracts imbricated, ovate, obtuse with a crenulate margin.

HAB.—Stones in mountain streams. Fr. 8.

Cairngorum (Herb. *Borrer*)! Ben Nevis (*Hooker*)!! Ben Mac Dhui (*Hunt* 1868)!!

Var.  $\beta$ . *Schimperi* *Lorentz*.

More slender, in dense, olivaceous, soft turgid tufts. Leaves  $\frac{1}{3}$  smaller, more acuminate, obtuse, nerves shorter.

SYN.—*Hypnum Schimperianum* LORENTZ Moosstudien 123, t. 5 (1864).

*Hyp. molle* Var. *Schimperianum* SCHIMP. Synops. 2 ed. 775.

*Amblystegium molle* Var. *Schimperi* LINDB. Musc. scand 33.

HAB.—Lochnagar (*Fergusson*).

This species and the last are very closely allied, and have been much confused with each other and with *A. alpestre* SWARTZ, they have however a very different habit, colour and texture, and should I think be kept distinct. *A. alpestre* has the habit of *molle*, but the leaves are very concave, oval with a short recurved apiculus, the median cells very long and linear, and those of the basal angles orange large and rectangular. I have not seen the variety *Schimperi*.

### 35. AMBLYSTEGIUM OCHRACEUM (*Turn.*) *Lindb.*

Dioicous; stems suberect, taller, flaccid, little branched. Leaves secund, ovato-lanceolate, concave, rather obtuse, with a forked nerve, reaching middle. Perich. bracts recurved, capsule cernuous, with a longish neck. (T. XCV, D.)

SYN.—*Hypnum ochraceum* TURNER in Herb. WILS. Bry. brit. 400, t. 58 (1855). SCHIMP. Synops. 639 (1860), 2 ed. 782. BERK. Handb. br. m. 126 (1863). MILDE Bry. siles. 375 (1869). HOBK. Synops. 177 (1873). BOULAY Musc. Fr. 20 (1884). LESQ. JAMES Moss. N. Amer. 401 (1884). HUSN. Musc. gall. 411, t. 119 (1894). DIX. JAMES. Stud. Handb. 485 (1896).

*H. palustre* Var. *HOOK.* in Herb.

*Limnobia ochraceum* BR. SCH. Bry. eur. fasc. 62—64 Suppl. t. 2 (1855).

*Stereodon ochraceus* MITT. in Journ. Linn. soc. viii, 42 (1864).

*Amblystegium ochraceum* LINDB. Musc. scand. 33 (1879).

Dioicous; in lax soft tufts, yellowish-green above, ochraceous at base. Stems elongated, ascending, with few branches, flexuose, incurved at apex, not radiculose. Leaves crowded more or less secund and falcate, variable in form, concave, ovate-oblong and elongate lanceolate, with a short or long acumen, obtuse, entire or obsoletely denticulate at apex, generally sulcate, nerve slender, forked or simple, reaching to or beyond middle; cells narrow and flexuose above, large rectangular and hyaline at basal angles. Perich. bracts squarrosorecurved, lanceolate, not sulcate, nerved to middle, obtusely serrate at apex. Capsule from a short erect neck, incurvo-cernuous, oval-oblong, olivaceous, annulus broad of three rows of cells, lid mamillar; teeth pale orange with a hyaline border. Male infl. with numerous bracts, patulous at apex, nerveless.

HAB.—On stones in streams in subalpine districts. Fr. 6.

Ballycheulish, Ireland (*Turner* 1807). Ben Nevis (*Hooker* 1808). Clova and Lochnagar (*Don* 1807). Bantry (*Miss Hutchins*). Kelly's Glen, Dublin, c. fr. (*Moore* 1849). Seefing Mtn. Wicklow c. fr. (*Taylor*). Carron Water (*Lyle*). Gorple Clough, Todmorden, c. fr. (*Nowell* 1851)!! Dolgelly and Aber falls (*Wilson*). Ben Lawers, in the Loch-na-Chat stream, c. fr. (*Braithwaite* 1865)!!

Var  $\beta$ . *flaccidum* *Milde*.

Stem elongated, lax-leaved. Leaves spreading on all sides, elongated, broadly lanceolate, with a longer point, the nerve double and longer.

SYN.—*H. ochraceum* Var. *flaccidum* MILDE Bry. siles. 376.

HAB.—West Yorkshire (*Whitehead*).

*A. ochraceum* is very variable in size and in the direction of the leaves and is often confounded with the next, but is quite distinct by the longer soft leaves with large hyaline cells at angles and squarrose perichætal bracts.

### 36. *AMBLYSTEGIUM PALUSTRE* (*Huds.*) *Lindb.*

Autoicous; yellowish or lurid green. Stem creeping, with short simple suberect branches, curved and pointed at apex. Leaves more or less secund, spreading, oval-oblong, concave, shortly pointed or rounded and obtuse, nerved half-way or with two short nerves. Caps. ovate, cernuous. (T. XCV, E.)



SYN.—*Hypnum heterophyllum aquaticum, polycephalum repens* DILL. Hist. musc. 293, t. 37, f. 27A (1741) et Herbar.

*Hypnum palustre* HUDS. Fl. angl. 429 (1762). L. Sp. pl. 2 ed. 1593 (1763). SCHREB. Spic. fl. Lips. 101 (1771). WITHER. Bot. arrang. ii, 687 (1776). WEB. Spic. fl. Goett. 68 (1778). ROTH Fl. germ. III, P. I, 295 (1800). BRID. Musc. rec. II, P. II, 117 (1801), Mant. 181 (1819), Bry. univ. ii, 639 (1827). SMITH Fl. brit. 1309 (1804), Eng. Bot. t. 1665. TURN. Musc. hib. 191 (1804). WEB. MOHR. Bot. Tasch. 365 (1807). ROEHL. Deutsch. fl. iii, 117 (1813). SCHWAEG. Suppl. I, P. II, 292 (1816). HOOK. TAYL. Musc. br. 110 (1818). GRAY Nat. arr. i, 764 (1821). HOOK. Fl. scot. P. 2, 147 (1821), Brit. fl. ii, 93 (1833). HUEBEN. Musc. germ. 630 (1833). DE NOT. Syllab. 45 (1838). RABENH. D. kr. fl. II, sec. 3, 270 (1848). C. MUELL. Synops. ii, 424 (1851). WILS. Bry. brit. 370 (1855). SCHIMP. Synops. 624 (1860), 2 ed. 772. BERK. Handb. br. m. 103, t. 7, f. 1 (1863). MILDE Bry. Siles. 372 (1869). HOBK. Synops. 176 (1873). BOULAY Musc. Fr. 25 (1884). LESQ. JAMES Moss. N. Am. 398 (1884). HUSN. Musc. gall. 410, t. 119 (1894). DIX. JAMES. Stud. Handb. 481 (1896).

*Hypnum heterophyllum* NECK. Meth. musc. 168 (1771).

*Neckera palustris* WILLD. Prodr. fl. Berol. n. 943 (1787).

*Hypnum luridum* HEDW. Musc. fr. iv, 99, t. 38 (1797), Sp. musc. 292 (1801). SWARTZ Musc. suc. 58 (1799). BRID. Sp. musc. II, 230 (1812).

*Hypnum adnatum* (non HEDW.) TURN. Musc. hib. 165. Eng. Bot. t. 2406.

*Hypnum fluviatile* (non HEDW.) TURN. op. c. 192. Eng. Bot. t. 1303.

*Hypnum latevirens* TURN. op. c. 149, t. 13.

*Limnobium palustre* BR. SCH. Bry. eur. fasc. 55—56, p. 2, t. 1 (1853). DE NOT. Epilogo 161 (1869).

*Amblystegium palustre* LINDB. Musc. scand. 33 (1879).

Autoicous; in yellowish or lurid green tufts, sometimes rufescent, often black and denuded at base. Stems creeping, with erect or ascending branches, incurved at apex. Leaves more or less secund, crowded, ovato- and oblongo-lanceolate, pointed or obtuse, concave, narrowed at decurrent base, margin incurved towards apex; nerve thin reaching middle or shorter and double, sometimes none; cells short, linear and flexuose, subopake, basal angular few, quadrate, not large, generally with granular contents. Inner perich. bracts elongate-lanceolate, many sulcate, thin-nerved. Capsule oblong or cylindraceous, incurvo-cernuous, orange-brown, when dry arcuate and constricted below mouth; lid orange, convex-conic; annulus none, teeth pale yellow, arcuato-incurved, cilia 2—3. Male infl. small, with ovate acute nerveless bracts.

HAB.—On stones and rocks by streams; common in subalpine districts.  
FR. 6.

Var. *β. hamulosum* Br. Sch.

Slender, ascending, with few branches, rufescent. Leaves smaller, falcato-sekund, with a short forked nerve.

SYN.—*Limnobium palustre* Var. *hamulosum* Bry. eur. l. c.

HAB.—In similar localities on wood.

Var. *γ. subsphæricarpon* (Schleich.).

More robust, much branched, the branches simple incurved at points; leaves larger, very concave, with incurved margins, falcato-secund, nerved to  $\frac{3}{4}$  their length. Capsule short, turgid oval.

SYN.—*Hypnum subsphæricarpon* SCHLEICH. Cent. Plant. II, n. 46. BRID. Sp. musc. II, 232. Bry. univ. ii, 641. SCHWAG. Suppl. I, P. II, 302.

*Limnobia palustre* Var. *subsphæricarpon* Bry. eur. l. c.

*Limnobia subsphæricarpon* DE NOT. Epilogo 162.

HAB.—In more alpine situations, not common.

Ochil glen (Lyle 1852). Helk's wood, Ingleton (Wilson). Pentland hills (Greville). Portree, Skye and Marple, Cheshire (Hunt 1863)!! Grasmere (Barnes 1868)!! Stock Ghyll Force (Whalley 1885). Near Carrickfergus (Rev. C. A. Johns).

So polymorphous is this species that a long series of varieties might be set up, without much benefit, as they do not appear to maintain their stability, and even two forms of nerve may be found in leaves from the same plant.

### 37. *AMBLYSTEGIUM EUGYRIUM* (Schimp.) Lindb.

Autoicous; in depressed yellow-green tufts, much branched. Leaves crowded, secund, erecto-patent, oblongo-lanceolate, acuminate, nerve none or two short faint lines; auricles orange, of rectangular cells. Perich. bracts lanceolate, denticulate at apex. Capsule arcuate, cylindric, annulus large. (T. XCV, F.)

SYN.—*Limnobia eugyrium* SCHIMP. Bry. eur. fasc. 62—64, Suppl. t. i (1855).

*Hypnum eugyrium* SCHIMP. Synops. 639 (1860), 2 ed. 781. BERK. Handb. xxxv (1863). MILDE Bry. siles. 373 (1869). HOBK. Synops. 177 (1873). BOULAY Musc. Fr. 21 (1884). LESQ. JAMES MOSS. N. Amer. 401 (1884). HUSN. Musc. gall. 411, t. 119 (1894). DIX. JAMES. Stud. Handb. 484 (1896).

*Amblystegium eugyrium* LINDB. Musc. scand. 33 (1879).

Autoicous; in bright yellow-green soft depressed tufts; stems much branched. Leaves variable in form, crowded, cauline turned to two sides, oblongo-lanceolate, acuminate, acute, concave, margin often incurved above, apex minutely denticulate; nerve none, or very short, bifurcate and faint; cells short linear, the basal angular cells large inflated, orange-brown or hyaline, forming small well-defined auricles; ramuline secund, flexuoso-falcate, elongato-lanceolate, curved. Perich. bracts patulous from the middle, the inner long whitish, erect, lanceolate, plicate, nerved above middle, denticulate at apex. Capsule cernuous, oblong, turgid, yellow-brown, annulus very broad, of 2—3 rows of cells,

teeth solid, yellow, cilia nodulose. Male infl. turgid, bracts numerous, rather squarrose, ovate.

HAB.—On rocks in streams in subalpine districts. Fr. 6.

Near Aber, N. Wales (*Wilson* 1858)!! Dennant, Conway (*Wilson*). Barra waterfall, Keswick. Kentmere, Westmoreland (*J. M. Barnes* 1869)!! Lodore, Cumberland (*Binstead* 1889)! Torc cascade, Killarney (*Wilson*).

Var. *β. Mackayi Schimp.*

More robust, in denser rufous-brown tufts, with somewhat obtuse branches. Leaves subsecund, or erecto-patent, subimbricated, broadly oblong, less acuminate. Perichætium shorter, the inner bracts shorter, patent, less sulcate, capsule shorter.

SYN.—*Hypnum eugyrium* Var. *β. Mackayi* SCHIMP. Synops. 2 ed. 782. HOBK. Synops. 2 ed. 228.

HAB.—On boulders in streams and about waterfalls, often intermixed with the type and more frequent here.

Torc waterfall (*Mackay*)!! Kentmere (*J. M. Barnes* 1869)!! Stream above the fall, Aber, N. Wales (*Wilson* 1858)!! Lyndale, Devon (*Nowell* 1864)!! Rumbling bridge, Dunfermline (*Dr. Wood*). Cautley waterfall, Dent (*Nowell*). Lodore (*Binstead* 1888)! Glengariff, Cork (*Binstead* 1896)!

Very variable in the form of leaf, but may be mistaken for a form of *palustre*. The nerves are figured much too strongly on the plate, and generally none are visible.

Sect. 6. *CALLIERGON Sulliv.* Stems erect, ascending, with few divisions or subpinnate, terete, turgid. Leaves more or less closely imbricated, ovate and oblong obtuse, deeply concave, not striate glossy, cells minute, linear, those at basal angles often large and hyaline.

#### CLAVIS TO THE SPECIES.

Stems more or less pinnate-branched, leaves scarcely imbricated.

Stem leaves broad cordate obtuse, green.

Branches numerous, leaves with very long narrow cells and sharply defined auricles.

— few, cells lax, auricles indistinct.

— oblong apiculate, purple.

— nearly simple, leaves imbricated when dry.

Leaves roundish obtuse, brownish, auricles indistinct.

— oblong yellowish, auricles distinct.

*giganteum.*  
*cordifolium.*  
*sarmentosum.*

*trifarium.*  
*stramineum.*

#### 38. *AMBLYSTEGIUM GIGANTEUM* (*Schimp.*) *De Not.*

Dioicous; robust tall closely pinnate, deep lurid green. Cauline leaves erecto-patent, cordate-ovate, obtuse, with large decurrent auricles, formed of inflated quadrate cells sharply defined from the long

narrow flexuose cells above them ; nerve vanishing below apex. Fruit of *A. cordifolium*. (T. XCVI, A.)

SYN.—*Hypnum cordifolium*  $\beta$ . *fasciculatum* DE NOT. Syllab. 44 (1838).

*Hypnum cordifolium*  $\beta$ . *compactum* C. MUELL. Synops. ii, 380 (1851).

*Hypnum cordifolium* Var. *stenodictyon* Bry. eur. fasc. 57—61 (1854).

*Hypnum giganteum* SCHIMP. Synops. 642 (1860), 2 ed. 787. BERK. Handb. add. p. xxxv (1863). MILDE Bry. siles. 368 (1869). HOBK. Synops. 178 (1873). BOULAY Musc. fr. 14 (1884). LESQ. JAMES Moss. N. Amer. 403 (1884). HUSN. Musc. gall. 416, t. 120 (1894). DIX. JAMES. Stud. Handb. 489 (1896).

*Amblystegium giganteum* DE NOT. Epilogo 135 (1869).

Dioicous ; in deep fastigate tufts 6—12 in. high, deep lurid or yellowish green. Stems erect, sparingly radiculose, densely pinnate, the branches accrescent for  $\frac{2}{3}$  its length, then decrescent to apex, patulous, obtuse or acute towards apex. Cauline leaves large, erecto-patent, somewhat glossy, broadly cordate- and oblong-ovate, obtuse or subcucullate at apex, at the decurrent angles deeply excavate, hyaline or rufescent ; nerve compressed, reaching nearly to apex ; cells of auricles large, inflated, quadrate, occupying  $\frac{3}{4}$  width of base and sharply defined from the upper long narrow linear flexuose cells. Branch-leaves long, lingulate, the terminal subulate and tubulose. Perichætia sometimes crowded, long, bracts imbricated, inner oblong-lanceolate, subconvolute. Capsule on a tall purple seta, horizontal, oblongo-cylindric, gibbous, orange-brown, exannulate, teeth of peristome yellow. Male plant smaller with fewer branches, infl. numerous, minute gemmiform.

HAB.—Deep bogs on heaths and banks of streams. Fr. 5—6.

Hale moss and Wybunbury bog, Cheshire c. fr. (Wilson 1863)!! The Keltie burn above Brachlin falls, Callander (*Braithwaite* 1865)!! Balquidder, Lochearnhead (*Hunt* 1865)! Auchinblae, Kincardine c. fr. (*Hunt* 1871)! Near Whitworth green station, Birkdale (*Wilson* 1864). Near Oxford (*Boswell* 1894)!! Benson Knott, Kendal (*Binstead* 1885). Rhos Goch, Radnor (*Binstead* 1892).

This fine moss was named by Wilson *spurium* and also *spectabile*, and is readily known by its ramification and cell-structure. A very closely allied species, intermediate between this and *cordifolium*, was found in America, and named *Stereodon Richardsoni* by Mitten, afterwards detected in Europe and named *Hypnum Breidleri* by Juratzka ; it has been found in the Swiss alps and throughout Scandinavia, so we hope it may be found also to be native here. Its differential characters are—Autoicous and more nearly resembling *cordifolium*, but more branched, the leaves closer, shining, with less distinct auricles, the median cells shorter and wider than in *giganteum* ; perich. bracts nerved to  $\frac{3}{4}$ .—

### 39. AMBLYSTEGIUM CORDIFOLIUM (*Hedw.*) *De Not.*

Autoicous ; stem repeatedly divided, with distant, irregular pinnæ. Leaves erecto-patent, cordate-ovate, muticous, longly decurrent, cells

laxer, narrowly rhomboid, at base and angles hexagono-rectangular. Capsule oblong-cylindric, arcuate. (T. XCVI, B.)

SYN.—*Hypnum cordifolium* HEDW. Musc. frond. iv, 97, t. 37 (1797), Sp. musc. 254 (1801). SWARTZ Musc. suc. 62 (1799). BRID. Musc. rec. II, P. II, 180 (1801), Sp. musc. II, 121 (1812), Mant. 159 (1819), Bry. univ. ii, 565 (1827). SMITH Fl. brit. 1318 (1804), Eng. Bot. t. 1447. SCHULTZ Fl. Starg. 337 (1806). WEB. MOHR. Bot. Tasch. 320 (1807). VOIT Musc. Herb. 119 (1812). ROEHL. Deutsch. fl. iii, 104 (1813). SCHWABG. Suppl. I, P. II, 229 (1816). HOOK. TAYL. Musc. brit. 107 (1818). FUNCK Moostasch. 59, t. 41 (1821). HOOK. Fl. scot. P. 2, 146 (1821), Brit. Fl. ii, 90 (1833). GRAY Nat. arr. Br. pl. i, 762 (1821). HUEBEN. Musc. germ. 654 (1833). RABENH. D. kr. fl. II, S. 3, 289 (1848). C. MUELL. Synops. ii, 379 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 47, t. 32 (1854). SCHIMP. Synops. 641 (1860), 2 ed. 785. WILS. Bry. brit. 374 (1855). BERK. Handb. 107, t. 7, f. 6 (1863). MILDE Bry. siles. 367 (1869). HOBK. Synops. 178 (1873). BOULAY Musc. Fr. 15 (1884). LESQ. JAMES. Moss. N. Amer. 402 (1884). HUSN. Musc. gall. 415, t. 120 (1894). DIX. JAMES. Stud. Handb. 488 (1896).

*Hypnum cuspidatum*  $\beta$ . *bicolor* TURN. Musc. hib. 176 (1804).

*Hypnum phyllorhizans* P. BEAUV. Prodr. 67 (1805).

*Amblystegium cordifolium* DE NOT. Epilogo 136 (1869).

Autoicous; in lax soft bright or yellowish-green tall or depressed tufts. Stems 3—6 in. high, flexuose-erect or procumbent, sparingly radiculose, repeatedly divided, ramuli few, scattered, acute at points. Cauline leaves cordate-ovate and broadly ovate-oblong, mucous, erecto-patent, contracted at base and longly decurrent, soft entire, nerve slender, nearly reaching apex; upper cells narrowly rhomboid, laxer in middle, all at base and angles pellucid, dilated hexagono-rectangular, chlorophyllose. Perichætium on a longish rooting branch, long, imbricated, bracts acutely acuminate, long-nerved, inner subvaginant. Capsule on a long seta, horizontal, oblongo-cylindric, when moist subincurved, when dry arcuate, badius leptodermous exannulate, lid mamillar; peristome large, pale yellow, processes hyaline, entire, cilia 2—3, slender.

HAB.—Marshy fields and ditches. Fr. 4—5.

This pretty moss is not uncommon, but the fruit is not by any means so, but when it does occur is plentiful, and a mass of it is a beautiful sight. Resembling *cuspidatum* somewhat, the nerved leaf will at once distinguish it; like several allies constantly growing in water, it frequently throws out tufts of radicles from the ends of the leaves.

#### 40. AMBLYSTEGIUM SARMENTOSUM (Wahl.) De Not.

Dioicous; in depressed purple tufts with short pointed branches. Leaves crowded, erecto-patent, elliptic-oblong, concave, cucullate, apiculate, nerved nearly to apex, base with decurrent auricles. (T. XCVI, C.)



SYN.—*Hypnum cuspidatum* Var  $\beta$ . TURN. Musc. hib. 177 (1804).

*Hypnum sarmentosum* WAHLENB. Fl. lapp. 380 (1812), Fl. suecica ii, 701 (1826). HUEBEN. Musc. germ. 655 (1833). C. MUELL. Synops. ii, 380 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 48, t. 33 (1854). WILS. Bry. br. 374 (1855). SCHIMP. Synops. 643 (1860), 2 ed. 788. BERK. Handb. br. m. 106 (1863). MILDE Bry. siles. 368 (1869). HOBK. Synops. 178 (1873). BOULAY Musc. Fr. 17 (1884). LESQ. JAMES Moss. N. Amer. 403 (1884). HUSNOT Musc. gall. 416, t. 121 (1894). DIX. JAMES. Stud. Handb. 490 (1896).

*Hypnum cordifolium* Var. HOOK. TAYL. Musc. brit. 107.

*Hypnum stellatum*  $\epsilon$ . *Terræ novæ* BRID. Bry. univ. ii, 603 (1827).

*Hypnum trifarium*  $\beta$ . *sarmentosum* RABENH. D. kr. fl. II, s. 3, 290 (1848).

*Amblystegium sarmentosum* DE NOT. Epilogo 136 (1869).

Dioicous; in rather lax, depressed reddish or black-purple tufts, the young shoots green. Stems prostrate, densely or remotely ramulose, the branches short erect unequal acute; radicles none. Leaves patulous, when dry laxly incumbent and subflexuose, the young only green, the rest purplish or straw-coloured, very glossy, oblong-ligulate or elliptic-lanceolate, cymbiform-concave, the apex obtuse, subcucullate, with or without a short apiculus; nerve purple, vanishing below apex; at the subdecurrent angles excavate and composed of inflated rectangular hyaline cells, becoming shorter incrassate and hyaline towards nerve, the upper very narrow and linear. Perichætium pale, on a short non-rooting branch, elongate subvaginant, bracts with a slender nerve, inner apiculate obsoletely sulcate. Capsule cernuous or horizontal, rather small, ovate-oblong or subcylindric, ferrugineo-fuscous, arcuate when dry. Annulus none; lid acutely apiculate; teeth yellow. Male infl. gemmaceous, bracts ovato-acuminate, concave, nerveless.

HAB.—In mountain bogs, not common. Fr. rare, 5—6.

Brandon mountain, Ireland and Killarney (*Taylor*). Canlochan, Braemar (*Gardiner*)!! Micklefell (*Teesdale*). Killin (*Wilson*). Carnedd Llewellyn (*Wilson*). Glen Laxey, Isle of Man. Ben Beck, Castleton of Braemar c. fr. (*Gardiner* 1845). Near Twll du c. fr. (*Palgrave* 1865). Glen Prosen c. fr. (*Fergusson* 1867)!! Ben Ledi c. fr. (*McKinlay*).

Although somewhat resembling *cuspidatum*, the colour, and nerved apiculate leaf at once distinguish it.

#### 41. **AMBLYSTEGIUM STRAMINEUM** (*Dicks.*) *De Not.*

Dioicous; stem erect with filiform, nearly simple branches. Leaves imbricated, erecto-patent, ovate-oblong, obtuse, nerved nearly to apex, auricled. Capsule oblong-cylindric. (T. XCVII, A.)

SYN.—*Hypnum stramineum* DICKS. Pl. crypt. Fasc. II, p. 6, t. 1, f. 9 (1790). HOFFM. Deutsch. fl. ii, add. ad p. 77 (1795). WITHER. Bot. arr. 3 ed. iii, 860 (1796). SWARTZ Musc.

succ. 62 (1799). ROTH Fl. germ. iii, P. I, 325 (1800). BRID. Musc. rec. II, P. II, 172 (1801), Sp. musc. II, 130 (1812), Mant. 161 (1819), Bry. univ. ii, 568 (1827). SMITH Fl. brit. 1303 (1804), Eng. Bot. t. 2405. TURN. Musc. hib. 164 (1804). P. BEAUV. Prodr. 71 (1805). WEB. MOHR Bot. Tasch. 320 (1807). WAHLENB. Fl. lapp. 380 (1812). ROEHL. Deutsch. Fl. iii, 106 (1813). SCHWAEG. Suppl. I, P. II, 212 (1816). HOOK. TAYL. Musc. Br. 97 (1818). SCHULTZ Fl. starg. Suppl. 75 (1819). FUNCK Moostasch. 57, t. 38 (1821). GRAY Nat. arr. i, 755 (1821). WALLR. Fl. cr. germ. i, 241 (1831). HOOK. Br. fl. ii, 79 (1833). HUEBEN. Musc. germ. 645 (1833). MACKAY Fl. hibern. 39 (1836). DE NOT. Syllab. 21 (1838). RABENH. D. kr. fl. II, s. 3, 290 (1848). C. MUELL. Synops. ii, 378 (1851). BR. SCH. Bry. eur. fasc. 57—61, p. 49, t. 34 (1854). WILS. Bry. Br. 373 (1855). SCHIMP. Synops. 646 (1860), 2 ed. 792. BERK. Handb. 105, t. 7, f. 4 (1863). MILDE Bry. siles. 369 (1869). HOOK. Synops. 178 (1873). BOULAY Musc. Fr. 11 (1884). LESQ. JAMES Moss. N. Amer. 405 (1884). HUSNOT Musc. gall. 417, t. 121 (1894). DIX. JAMES. Stud. Handb. 487 (1896).

*Amblystegium stramineum* DE NOT. Epilogo 137 (1869).

Dioicous; plants soft filiform nearly simple, in lax pale green or straw-coloured glossy tufts. Stems 2—5 in. high, weak, simple or divided, ramuli none or few short terete and pointed. Leaves erectopatent, imbricated, ovate-oblong, obtuse and subcucullate, concave, lightly plicate, excavate at angles and forming hyaline decurrent auricles of large rectangular cells, the upper cells narrowly linear-rhomboidal, nerve thin, reaching to  $\frac{3}{4}$  length of leaf. Perichætium on a rooting branch, elongated, laxly imbricated, bracts acutely acuminate, inner eroso-dentate at point, with a very thin nerve, not plicate. Capsule on a long thin orange seta, small, cernuous, turgidly oblong or incurvo-cylindraceous, castaneous; annulus none; peristome yellow, densely trabeculate, endostome whitish, with 1—2 cilia.

HAB.—In marshy heaths and among *Sphagnum*. Fr. 5—6.

Not uncommon in the north. Fruit rare, Stansfield moor, Todmorden (Nowell)!! Stayley Brushes and Prestwich, Manchester (J. Tinker). Sands of Barry, Dundee (Gardiner). Castle Kelly Glen, Dublin (Taylor). Hale moss, Cheshire (Hunt 1863)!! Barloch, Milngavie (McKinlay 1862).

This moss is remarkable for its long flaccid simple innovations, and is attached to peaty swamps, or the sandy hollows or gutters on the moors, and it is only in the latter kind of places that we may expect to find fruit. The leaves often throw out radicles from the tips.

#### 42. *AMBLYSTEGIUM TRIFARIUM* (Web. Mohr) De Not.

Dioicous; in rigid lurid green tufts. Stem erect, scarcely branched. Leaves imbricated, 5-farious, ovate, rounded at apex, concave, nerved to middle. Capsule ovate-oblong, cernuous. (T. XCVII, B.)

SYN.—*Hypnum trifarium* WEB. MOHR Reise durch Schweden 177, t. 2 (1804), Bot. Tasch. 319 (1807). ROEHL. Deutsch. Fl. iii, 105 (1813). BRID. Sp. musc. II, 127 (1812), Mantissa 162 (1819), Bry. univ. ii, 567 (1827). WAHLENB. Fl. lapp. 381 (1812), Fl. succ. ii, 701 (1826). FUNCK Moostasch. 57, t. 38 (1821). SCHULTZ Fl. stargard. Suppl. 76 (1819).

HOOK. TAYL. Musc. brit. 2 ed. 161, suppl. t. 4 (1827). GREV. Scott. cr. fl. t. 279 (1827). HUEBEN. Musc. germ. 646 (1833). HOOK. Br. Fl. ii, 79 (1833). RABENH. D. kr. fl. II, s. 3, 290 (1848). C. MUELL. Synops. ii, 381 (1851). BR. SCH. Bry. eur. fasc. 57-61, p. 50, t. 35 (1854). WILS. Bry. br. 373, t. 34 (1855). SCHIMP. Synops. 647 (1860), 2 ed. 793. BERK. Handb. 106, t. 7, f. 5 (1863). MILDE Bry. siles. 370 (1869). HOBK. Synops. 179 (1873). BOULAY Musc. Fr. 12 (1884). LESQ. JAMES. Moss. N. Amer. 405 (1884). HUSN. Musc. gall. 417, t. 121 (1894). DIX. JAMES. Stud. Handb. 488 (1896).

*Hypnum uliginosum* SCHLEICH. Cent. III, n. 54.

*Hypnum illecebrum* SCHULTZ Fl. starg. 318, excl. syn. Brid. (1806).

*Hypnum stramineum* β. SCHWÆG. Suppl. I, P. II, 212, t. 89 (1816).

*Amblystegium trifarium* DE NOT. Epilogo 138 (1869).

Dioicous; in lax tall rigid fragile tufts, lurid-green above, fuscous or black at base. Stem flexuoso-erect, the innovations simple or with a solitary branch here and there, from a filiform base, gradually thickened and julaceous by imbrication of the leaves. Leaves quinque-farious, glossy, imbricated, broadly ovate and ovate-oblong, slightly decurrent, rounded at apex, cochleariform-concave, nerve simple reaching middle, sometimes shorter and double; cells narrowly linear-vermicular, those of angles short and rectangular. Perichætium laxly imbricated. inner bracts elongate-lanceolate, deeply sulcate, thin-nerved. Capsule on a red flexuose seta, small cernuous and horizontal, oblong-cylindric, slightly incurved, ferruginous; lid convex-conic, rufescent, annulus of 3 rows of minute cells. Male infl. numerous, gemmiform, imbricated.

HAB.—Peat bogs and rills on the higher mountains; sterile.

Ben Lawers, Ben Challum, Craig Chailleach, &c., in the Breadalbane range (*Greville and Hooker*)!! Ben Nevis (*Sir J. Hooker*). Sligichan, Skye (*Hunt* 1863).

A very distinct moss both in habit and form of leaf, and when fresh having a varnished appearance. It fruits plentifully in some parts of Sweden and Norway.

## 5. HYPNUM *Dill. L.*

Cat. Giss. 215 (1718).

Plants prostrate, creeping or ascending, small or of medium size, pinnately branched, sometimes with paraphyllia. Leaves equal, spreading on all sides, ovate or lanceolate, sometimes imbricated, the cells linear-vermicular above, quadrato-rectangular at basal angles and basal insertion, nerve ending below apex and often excurrent at back as a prickle-shaped point. Seta more or less rough with tubercles or quite smooth; capsule cernuous or horizontal, ovate or cylindraceous, gibbous with a short neck; lid conical and apiculate or rostellate or

rostrate; peristome of 16 lanceolate-subulate hygroscopic teeth, with a hyaline border, endostome tubular at base, the processes lanceolate, cleft in the middle and with 2—3 cilia. Inhabiting the ground, stones or trunks of trees.—Der. *υπνος* sleep.

The genus *Hypnum* originally contained all the pleurocarpous mosses, but gradually many of these were separated into independent genera, leaving however a host of species so closely allied that it was found impossible to divide them further into genera in the ordinary acceptation of the term, hence Schimper in the *Bryol. europæa* broke them up into groups, giving them generic position, though really only subgenera or sections. For some pertinent remarks on this subject see MITTEN in *Journ. Linn. Soc.* viij, p. 13.

The sections are—

1. MYURIUM Schimp. *H. Hochstetteri*.
2. SCLEROPodium Schimp. *H. illecebrum*.
3. PANCKOWIA Necker. *H. striatum*.
4. RHYNCHOSTEGIELLA Schimp. *H. Teesdalei*.
5. RHYNCHOSTEGIUM Schimp. *H. rusciforme*.
6. RHAPHIDOSTEGIUM Schimp. *H. demissum*.
7. BRACHYTHECIUM Schimp. *H. rutabulum*.
8. PLEUROPUS. Griffith. *H. seviceum*.

One of these sections—*Rhaphidostegium*—has but slight affinity with the rest, and belongs to Mitten's genus *Sematophyllum* of which there are above 100 species, and characterized by the few very large hyaline angular cells. Lindberg regarded it as belonging to *Leptohymenium*.

Sect. 1. MYURIUM Schimp. Stems creeping, turgid, julaceous, irregularly branched. Leaves densely imbricated, glossy, concave, ovate-acuminate, nerves two, short and faint, or obsolete, cells very narrow, vermicular. Seta smooth; capsule oblong, lid conico-rostellate in *Berthelotianum*.

#### 1. HYPNUM HOCHSTETTERI Schimp.

Dioicous; in yellowish-brown glossy tufts. Leaves oblong, acuminate into a filiform apiculus, nerveless, margin incurved and sharply serrulate in the upper half. Fruit unknown. (T. XCVII, D.)

SYN.—*Hypnum Hochstetteri* SCHIMP. in litt. SEUBERT Fl. Azorica p. 14, No. 66 (1844). "Decumbens, dense cæspitosum, ramis crassiusculis julaceis, foliis dense imbricatis cochleariformibus ecostatis, ex apice obtuso longe apiculatis margine minutissime serratis—Colore viridi-aureo nitido insigne."

*Leucodon Lagurus* Var. *β. borealis* WILS. Bry. brit. 314, t. 61 (1855). BERK. Handb. Br. m. 150 (1863). HOBK. Synops. 139 (1873).

*Myurium Hebridarum* SCHIMP. Synops. 695 (1860), 2 ed. 807. HOBK. Synops. 2 ed. 201 (1884). HUSN. Musc. gall. 426, t. 124 (1894). DIX. JAMES. Stud. Handb. 390 (1896). LIMPR. in RABENH. kr. fl. Laubm. iii, 149 (1897).

Dioicous; in dense tufts readily falling apart, glossy, golden yellow-green above, pale fuscous below. Stems 1—3 in. long, creeping, irregularly branched, the branches erect, simple or dichotomous, tumid, julaceous, obtuse. Leaves densely imbricated, shining, appressed and subscariose when dry, soft when moist, obovate-oblong, concave, the basal angles rounded, nerveless, margins incurved and sharply serrulate in the upper half, suddenly narrowed into a lanceolate filiform point,  $\frac{1}{3}$  length of leaf; cells short, linear-vermiform, at base hexagono-rectangular, minute and subquadrate at angles. Fruit unknown.

HAB.—Rocks by the coast, Outer Hebrides.

N. Uist (*Dr. C. Smith*) !! Benbecula (*Stirton*). Near Loch Coruisk, Skye (*Rev. H. McMillan*). Tiree (*McVicar* 1897) !! Carn Mohr, Moidart, W. Inverness (*MacVicar*, Dec. 1898) !!

This beautiful moss has a close ally in another species found in the Canaries and Azores, *H. Berthelotianum* MONTAGNE, where our species is also found. Schimper must have overlooked the fact that he had already named and described the moss, as Hochstetter's specimen is in its proper place with the Hebridean plant in his herbarium, and the tuft bears what appear to be broken setæ, but on denuding one of these at the side it will be seen they are continuations of the stem; I have figured it at C\*.

Sect. 2. *SCLEROPodium* Br. Sch. In soft glossy tufts having the habit of *Brachythecium*. Plants creeping or ascending, with julaceous obtuse branches, incurved when dry. Leaves crowded, imbricated and appressed when dry, very concave, ovate with a finely serrulate apiculus, cells very narrow, vermicular, at angles quadrate hyaline, nerve single or forked. Seta verrucose, rarely smooth; capsule cernuous or suberect, oblong slightly curved; peristome normal.

#### CLAVIS TO THE SPECIES.

Seta smooth. Stem regularly pinnate.  
Seta rough. Stem irregularly branched.  
Leaves rounded, with an apiculus.  
—— gradually pointed.

*purum*.  
*illecebrum*.  
*caspiotum*.

#### 2. *HYPNUM PURUM* L.

Dioicous; in pale green, lax soft tufts. Stem pinnate, branches tumid, slightly curved; leaves closely imbricated, ovate-oblong with a small recurved apiculus, very concave, entire, nerved half-way; capsule elliptic oblong, lid conical. (T. XCVIII, A.)



SYN.—*Muscus trichodes medius ramosus, foliis albis mollibus denticulatis dispositis* RAY Synops. 2 ed. 39 (1696).

*Hypnum terrestre erectum, ramulis teretibus foliis inter rotunda et acuta medio modo se habentibus* DILL. Cat. Giss. 220 (1719) et in RAY Synops. 3 ed. 81 (1724).

*Hypnum cupressiforme vulgare, foliis obtusis* DILL. Hist. musc. 309, t. 40, f. 45 (1741) et Herbar.

*Hypnum illecebrum* L. Fl. suec. n. 1032 (1716). SWARTZ Musc. suec. 61 (1799). Eng. Bot. t. 2189, f. 2. BRID. Musc. Rec. II, P. II, 91 (1801).

*Hypnum purum* L. Sp. pl. 1128 (1753). HUDS. Fl. angl. 427 (1762). WEISS Cr. Goett. 249 (1770). NECK. Meth. musc. 160 (1771), Del. gallo-belg. (1773). WITHER. Bot. arr. ii, 588 (1776). LIGHTF. Fl. Scot. ii, 758 (1777). WEBER Spic. Fl. Goett. 78 (1778). RELH. Fl. cant. 414 (1785). ROTH Fl. germ. i, 470 (1788). SIBTH. Fl. oxon. 300 (1794). ABBOT Fl. Bedf. 250 (1798). HOFFM. Deutsch. fl. ii, 58 (1795). SWARTZ Musc. suec. 60 (1799). HEDW. Sp. musc. 253, t. 66, f. 3—6 (1801). BRID. Musc. rec. II, P. II, 88 (1801), Sp. musc. II, 122 (1812), Mant. 160 (1819), Bry. univ. ii, 425 (1827). SM. Fl. brit. 1313 (1804), Eng. Bot. t. 1599. TURN. Musc. hib. 175 (1804). P. BEAUV. Prodr. 68 (1805). SCHULTZ Fl. starg. 318 (1806). WEB. MOHR Bot. Tasch. 316 (1807). VOIT Musc. herb. 114 (1812). WAHLENB. Fl. lapp. 372 (1812), Fl. carpat. 357 (1814). ROEHL. Deutsch. fl. iii, 106 (1813). SCHWAEGL. Suppl. I, P. II, 226 (1816). HOOK. TAY. Musc. brit. 98 (1818). HARTM. Skand. fl. Hook. Fl. scot. P. II, 143 (1821). GRAY Nat. arr. br. pl. i, 756 (1821). HUEBEN. Musc. germ. 648 (1833). DE NOT. Syll. 21 (1838). RABENH. D. kr. fl. II, s. 3, 288 (1848). WILS. Bry. brit. 376 (1855). BR. SCH. Bry. eur. fasc. 57—61, t. 38 (1854). SCHIMP. Synops. 646 (1860), 2 ed. 791. BERK. Handb. br. m. 109, t. 8 (1863). MILDE Bry. siles. 371 (1869). HOBK. Syn. br. m. 199 (1873). BOULAY Musc. Fr. 16 (1884). HUSN. Musc. gall. 419, t. 122 (1894).

*Hylocomium purum* DE NOT. Epil. 91 (1869).

*Hypnum (Scleropodium) purum* LINDB. Musc. scand. 34 (1879).

*Brachythecium purum* DIX. JAMES. Stud. Handb. 410 (1896).

*Scleropodium purum* LIMPR. RABENH. kr. fl. Laubm. iii, 147 (1897).

Dioicous; in soft lax yellowish-green or pale tufts. Stem flexuoso-prostrate or ascending, 3—6 in. long, more or less regularly pinnate, tumid; branches divergent, julaceous, obtuse. Stem leaves crowded, laxly imbricated, narrow at insertion, decurrent at angles, broadly oval or ovate-oblong, cochleariform-concave, broadly sulcate, at the rounded apex with a small recurved minutely serrulate apiculus, margin recurved at base; nerve pale and thin, reaching middle, sometimes shorter and double; cells small, linear-vermicular, the angular quadrate. Branch leaves narrower and smaller. Perich. bracts erect, with long subulate points, nerveless, not sulcate. Seta red, smooth, capsule horizontal, longish elliptic, castaneous, lid conical, pointed, peristome orange, inner yellow. Male infl. with numerous ovato-lanc. bracts.

HAB.—Dry banks in woods and pastures, common. Fr. 10—11.

### 3. *HYPNUM ILLECEBRUM* P. Beauv.

Dioicous; procumbent, irregularly branched, deep green; branches obtuse incurved, Leaves densely imbricated, roundish-ovate, concave

serrulate apiculate, nerve vanishing below apex. Seta rough, capsule ovate-oblong, cernuous, lid conic, apiculate. (T. XCVIII, B.)

SYN.—*Muscus terrestris, surculis basi geniculatis aut illecebræ æmulis, foliis subrotundis squamatis incumbentibus*. VAILL. Bot. Paris, 137, t. 25, f. 7 (1727).

*Hyphnum cupressiforme rotundius vel illecebræ æmulum* p.p. DILL. Hist. musc. 311, t. 40, fig. 46c (1741).

*Hyphnum illecebrum* (non L. nec HEDW.) P. BEAUV. Prodr. 65 (1805). SCHWABG. Suppl. I, P. II, 225 (1816). BRID. Mant. 60 (1819), Bry. univ. ii, 428 (1827). HUEBEN. Musc. germ. 649 (1833). DE NOT. Syllab. 22 (1838). RABENH. D. kr. fl. II, S. 3, 288 (1848). C. MUELL. Synops. ii, 376 (1851). WILS. Bry. brit. 343, t. 35 (1855). BERK. Handb. 84 (1863). HOBK. Synops. 151 (1873). BOUL. Musc. Fr. 120 (1884). LESQ. JAMES MOSS N. Amer. 347 (1884).

*Hyphnum Touretii* BRID. Sp. Musc. II, 185 (1812), Mant. 173 (1819).

*Hyphnum blandum* LVELL Mss. Hook. in Fl. Lond. new ser. HOOK. TAYL. Musc. brit. 2 ed. 176, t. v, suppl. (1827). HOOK. Br. Fl. ii, 88 (1833).

*Hyphnum illecebrum* β. *Touretii* BRID. Bry. univ. ii, 429 (1827).

*Scleropodium illecebrum* BR. SCH. Bry. eur. fasc. 45-46, p. 3, t. 2 (1853). SCHIMP. Synops. 547 (1860), 2 ed. 659. HOBK. Synops. 2 ed. 202 (1884). HUSN. Musc. gall. 330, t. 95 (1893). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 143 (1897).

*Brachythecium illecebrum* DE NOT. Epilogo 112 (1869). DIX. JAMES. Stud. Handb. 409 (1896).

*Eurhynchium illecebrum* MILDE Bry. siles. 305 (1869).

Dioicous; in rather dense procumbent tufts, glossy bright or yellowish green; branches ascending, short, decurved, obtuse, julaceous. Leaves dense imbricated when dry, erecto-patent when moist, ovate very concave, rounded with a short recurved apiculus, minutely serrulate towards point; nerve slender about  $\frac{2}{3}$  length of leaf, excurrent in a dorsal mucro; cells very narrow, vermiform, more elongated at base, rectangular at the impressed slightly decurrent angles. Perichætium laxly imbricated, inner bracts lanceolate-subulate nerved to middle, seta purple, strongly verrucose, capsule horizontal or cernuous, light brown, turgidly ovate, lid conical, apiculate; peristome yellow. Male infl. gemmiform, bracts broadly ovate, acuminate.

HAB.—Damp stony banks, not common. Fr. II—I.

Cadnam Lane, New Forest (*Lyell*). Holyhead and Aberffraw, Anglesey (*Wilson* 1830)!! Douglas, Castletown and Peel, Isle of Man. Killiney and Howth, Ireland. Maresfield and Aldrington beach, Sussex (*DAVIES* 1865)!! Mousehole cliff and Penzance (*CURNOW* 1865)!! Plymouth (*Holmes*). Queenstown, Cork (*Carroll*). Exwick (*Parfitt*). Derbyshire (*Bagnall*). Sallagh Braes (*Waddell*). Little Baddow, Essex (*Greenwood* 1845). Nesscliffe, Salop (*Hamilton & Benson* 1898)!!

The Mediterranean form, reaching 6 in. in length, closely resembles *H. purum*, but the colour and form of branches are very different, yet the two were confounded by most of the old botanists. The smooth seta of the latter

will also distinguish, but the fruit is not common in either. Hedwig's *H. illecebrum* is the American *H. Boscii* SCHWÆG.

#### 4. HYPNUM CÆSPITOSUM Wils.

Dioicous; stems creeping, densely matted, with many short incurved branches. Leaves spreading and subsecund, ovato-lanceolate, gradually pointed, serrulate, nerved to middle. Seta rough, capsule suberect, oblong, curved; lid conico-rostellate. (T. XCVIII, C.)

SYN.—*Hypnum cæspitosum* WILS. in Eng. Bot. Suppl. t. 2878 (1843), Bry. brit. 344 (1855). BERK. Handb. 83 (1863). HOBK. Synops. 151 (1873). BOUL. Musc. Fr. 120 (1884). LESQ. JAMES MOSS. N. Amer. 346 (1884).

*Hypnum cespitosum* C. MUELL. Synops. ii, 354 (1851).

*Scleropodium cæspitosum* BR. SCH. Bry. eur. fasc. 45-46, p. 2, t. I (1853). SCHIMP, Synops. 547 (1860), 2 ed. 658. HOBK. Synops. 2 ed. 202 (1884). HUSN. Musc. gall. 331. t. 95 (1893). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 142 (1897).

*Eurhynchium cæspitosum* MILDE Bry. siles. 305 (1869).

*Brachythecium cæspitosum* DIX. JAMES. Stud. Handb. 408 (1896).

Dioicous; densely cæspitose, depressed, soft, bright or dull green. Stem rooting, densely ramulose, the branches short erect and incurved. Stem-leaves patent, divergent on all sides or subsecund, when dry laxly imbricated, broadly ovato-lanceolate, acutely acuminate; nerve yellowish,  $\frac{3}{4}$  length of leaf, sometimes forked, cells at base two rows quadrate, at decurrent angles yellow and rectangular; ramuline oblongo-lanceolate, all concave, minutely serrulate, the margin recurved towards base. Perich. bracts lanceolate, acuminate, subserrate and recurved at point, faintly sulcate, with a short thin nerve; capsule on a minutely tuberculate red seta, purple suberect, oblong and a little incurved; lid conic, rostrate, peristome yellow. Bracts of male infl. ovate suddenly pointed.

HAB.—Sandstone walls and about tree-roots and stones, not common. Fr. 11-12.

Near Warrington and between Frodsham and Helsby, Cheshire (*Wilson*)!! By the Ouse at York (*Spruce*). By the Mole, Burford bridge and Stoke Dabernon (*Borrer*). Henfie d and Hurstpierpoint (*Mitten*)! Wembury, S. Devon (*Holmes* 1871). Near Cheetham (*Borrer* 1844). By the Wye, Erwood, Brecon (*Binstead* 1894). Doward Hills (*Rev. Aug. Ley*). Miller's dale and Dovedale, Derby (*Holt*). Holywell, Forge Mills and Curdworth, Warwick (*Bagnail*). Penhurst (*Holmes* 1875).

Sect. 3. PANCKOWIA Neck. Stems creeping or ascending, more or less pinnate. Leaves ovate or lanceolate, pointed, often longitudinally

plicate, the stem and branch leaves sometimes differing in form. Seta generally verrucose, or smooth; lid with a long beak.

## CLAVIS TO THE SPECIES.

Synicous, robust with glossy leaves.

*speciosum*.

Dioicous.

Seta smooth.

Stem- and branch-leaves dimorphous.

Branches short, straight

*strigosum*.

——— julaceous, arcuato-recurved.

*circinatum*.

Stem- and branch-leaves homomorphous.

Leaves strongly plicate, branches long, arcuate.

*striatum*.

——— feebly plicate, acuminate, branches short.

*meridionale*.

———, branches longer, acute.

*striatulum*.

Seta rough.

Leaves feebly plicate, with short acute points.

*crassinerv.*

——— not plicate.

Stem-leaves differing from branch-leaves, cordate, recurved with long tapering points.

*prælongum*.

Stem-leaves and branch-leaves alike, nerve ending at back in a thorn-like point.

*pallidirostre*.

Perich. bracts not squarrose.

——— squarrose.

Tufts dense, rather rigid.

Stolons frequent, branches and seta long, leaf-point not twisted.

*Swartzii*.

——— rare, branches short obtuse, leaf-points twisted  $\frac{1}{2}$ , seta short.

*Schleicheri*.

Tufts very loose, all leaves distant.

Not glossy, cells of leaf-points elongate, perich. bracts with a slender nerve.

*distans*.

Glossy, cells of leaf-points shorter and broader, perich. bracts nerveless.

*hians*.

5. *HYPNUM STRIATUM* Schreb.

Dioicous; stems loosely tufted, arched and procumbent or subdendroid, rigid. Leaves patent, cordate-acuminate, striated, coarsely serrate, nerved  $\frac{2}{3}$  length. Capsule subcylindric, curved, cernuous, lid rostrate. (T. XCVIII, D.)

SYN.—*Hypnum vulgare dentatum, operculis cuspidatis*. Var. *major setis et capsulis longioribus*. DILL. Hist. musc. 297, t. 38, f. 30 B (1741), et Herbar.

*Hypnum striatum* SCHREB. Spicil. fl. lips. 91 (1771). HEDW. musc. fr. iv, 32, t. 19 (1794). Sp. musc. 275. WITHER. Bot. arr. 3 ed. iii, 850 (1796). ROTH Fl. germ. i, 466 (1788). HOFFM. Deutsch. fl. ii, 75 (1795). SWARTZ Musc. suc. 60 (1799). SMITH Fl. brit. 1321 (1804). Eng. Bot. t. 1648. TURN. Musc. hib. 180 (1804). P. BEAUV. Prodr. 66 (1805). SCHWAEGL. Suppl. I, P. II, 238 (1816). HOOK. TAYL. Musc. brit. 106 (1818). HOOK. Fl. Scot. P. 2, 145 (1821). GRAY Nat. arr. i, 761 (1821). FUNCK Moost. 60, t. 43 (1821). WAHLEN. Fl. suc. ii, 704 (1826). HOOK. Br. fl. ii, 89 (1833). DE NOT. Syllab. 39 (1838). RABENH. D. kr. fl. II, S. 3, 278 (1848). C. MUELL. Synops. ii, 460 (1851). WILS. Bry. brit. 352 (1855). BERK. Handb. br. m. 91 (1863). HOBK. Synops. 154 (1873). BOUL. Musc. Fr. 112 (1884).

\**Hypnum longirostre* EHRL. Pl. crypt. exs. Dec. 8, no 75 (1788). BRID. Musc. rec. II, P. II, 154 (1801). Sp. musc. II, 193 (1812). Mant. 174 (1819). Bry. univ. ii, 502 (1827). SCHULTZ Fl. starg. 329 (1806). WEB. MOHR Bot. Tasch. 324 (1807). VOIT Musc. herbip. 94 (1812). ROEHL. Deutsch. fl. iii, 111 (1813). HUEB. Musc. germ. 670 (1833).

*Hypnum elasticum* BRID. Sp. musc. II, 256. Mant. 184.

*Eurhynchium longirostre* BR. SCH. Bry. eur. fasc. 57—61, p. 6 t. 5 (1854).

*Eurhynchium striatum* SCHIMP. Coroll. 119 (1856), Synops. 553 (1860), 2 ed. 666. MILDE Bry. siles. 301 (1869). HOBK. Synops. 2 ed. 204 (1884). HUSN. Musc. gall. 336, t. 96 (1893). LIMPR. in RABENH. kr. fl. Laubm. iii, 165 (1897). DIX. JAMES. Handb. 425 (1896).

*Rhynchostegium striatum* DE NOT. Cronaca Bri. ital. II, 11 (1867), Epilogo 76 (1869).

*Hylacomium striatum* KINDB. Laubm. Schwed. & Norw. 43 (1883).

Dioicous; in lax depressed, irregular incoherent tufts, bright or pale green. Plants long, rambling arcuato-prostrate, sometimes subdendroid, the branches elongate, erect, subflexuose, attenuate at apex. Cauline leaves densely crowded, divergent and multistriate, cordato-lanceolate, somewhat obtuse and scariose, branch-leaves obovate-lanceolate, all concave, plane at margin and sharply serrate, nerve vanishing below apex, angles excavate, slightly decurrent, with rectangular cells, the upper vermicular; paraphyllia rounded-ovate, concave. Perich. bracts pale squarrose, nerveless, inner sheathing with a long recurved apiculus; seta purple long and smooth, capsule cylindraceous, more or less arcuate, lid conic with a very long curved beak and a very broad annulus, peristome long, yellow, cilia 2—3, appendiculate.

HAB.—On the ground in woods, common in calcareous districts. Fr. 11—3.

A fine moss which at first was regarded as a variety of *rutabulum*, but readily known by the harsh patent deeply sulcate leaves and long-beaked operculum.

## 6. *HYPNUM MERIDIONALE* Schimp.

Dioicous; in dense dull brownish-green tufts with many short branches. Leaves crowded, squarrose, triangular-cordate, acutely acuminate. Capsule and seta shorter. (T. XCVIII, E.)

*Hypnum meridionale* SCHIMP. in litt. SENDTNER in Flora 1848, p. 65.

*Hypnum filescens* C. MUELL. Synops. ii, 462, p.p. (1851).

*Eurhynchium longirostre*  $\beta$ , *meridionale* BR. SCH. Bry. eur. fasc. 57—61, t. 5, fig. B (1854).

*Hypnum striatum* Var. *Duriei* MONT. in DURIEU Pl. Astur. No. 139.

*Eurhynchium striatum* Var. *meridionale* SCHIMP. Coroll. 119 (1856), Synops. 554 (1860), 2 ed. 667. HUSN. Musc. gall. 336 (1893). BOUL. Musc. Fr. 113 (1884).

*Eurhynchium meridionale* DE NOT. in PICCON. Elenco Musc. ligur. n. 32 (1863). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 167 (1897).

*Rhynchostegium meridionale* DE NOT. Cronaca II, 11 (1867), Epilogo 77 (1869).

*Hylacomium meridionale* KINDB. Eur. and Amer. Bry. 41 (1897).

Dioicous; in dense creeping dull yellowish or brownish-green tufts with descending stolons. Branches dense short and thick, curved when



dry. Paraphyllia numerous roundish. Stem leaves densely crowded, squarrose, slightly crisped when dry, broadly-triangular-cordate, more longly and acutely acuminate, feebly sulcate, often twisted at point, margin sharply serrate, nerve  $\frac{4}{5}$  the length of leaf; cells at base elongated, at the strongly excavate angles small, quadrate and oval, the upper very narrow; leaves of branches similar. Perichætium squarrose, inner bracts suddenly narrowed into a recurved toothed subula of equal length. Seta short and smooth, capsule cernuous, cylindraceous, reddish-brown, lid rather shorter, peristome yellow.

HAB.—On the ground and old walls in calcareous districts, rare. Fr. 12—2.

Limestone walls at Wells, Somerset (*Binstead* 1886) !!

This moss differs totally in habit from *striatum*, and there do not appear to be any intermediate forms connecting the two. Its head quarters are S. France, Italy, Spain, Portugal, and Algeria.

## 7. *HYPNUM STRIATULUM* *Spruce*.

Dioicous; stem creeping, densely tufted, with erect branches. Leaves erecto-patent, ovate-acuminate, substriated, serrated, nerved above half-way. Capsule ovate, cernuous, lid rostrate. (T. XCIX, A.)

SYN.—*Hypnum filescens* BRID. Sp. musc. II, 170 (1812). C. MUELL. Synops. ii, 462 (1851).

*Hypnum prælongum* Var. *filescens* BRID. Bry. univ. ii, 402 (1827).

*Hypnum striatulum* SPRUCE Musc. Pyren. No. 12 (1847), et Ann. & Mag. N. H. 1849, p. 284. WILS. Bry. brit. 352 (1855). BERK. Handb. 91 (1863). HOBK. Synops. 153 (1873). BOUL. Musc. Fr. 113 (1884).

*Eurhynchium striatulum* BR. SCH. Bry. eur. fasc. 57—63, p. 5, t. 4 (1854). SCHIMP. Synops. 552 (1860), 2 ed. 665. MILDE Bry. siles. 301 (1869). HOBK. Synops. 2 ed. 203 (1884). HUSN. Musc. gall. 335, t. 96 (1893). DIX. JAMES. Stud. Handb. 425 (1896). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 169 (1897).

*Hypnum Hildenbrandii* GAROV. in lit. JURATZ. Verh. zool.-bot. Ges. Wien 1859, p. 101.

*Rhynchostegium striatulum* DE NOT. Epilogo 78 (1869).

Dioicous; yellowish or dark green, about half the size of *striatum*, laxly cæspitose; stem creeping, stoloniform, with numerous short erect branches. Stem-leaves erecto-patent, suberect when dry, from a very narrow decurrent base, broadly cordato-lanceolate, longly acuminate, one or two faint plaits on each side, minutely serrulate at margin, nerve reaching  $\frac{3}{4}$  length, excurrent in a point at back, cells at the strongly impressed angles oval and shortly rectangular, upper about 5 times long as wide; branch-leaves ovate-lanceolate, short-pointed, sharply serrate. Perichætium subsquarrose, bracts pale, lanceolate with a long

filiform point, faintly nerved half-way; seta red, smooth; capsule inclined, oblong, rufo-ferruginous, lid conic with a subulate beak; peristome brown, inner yellow. Male plant similar.

HAB.—Shady calcareous rocks and roots of trees, not common. Fr. 12—3.

Mucruss, Killarney (*Wilson*). Arundel Park (*Mitten*)!! St. Vincent's rocks and Leigh woods, Bristol (*Borrer* 1845)! Plymouth (*Holmes*)!! Billacombe (*Holmes*), all in fruit.

### 8. *HYPNUM STRIGOSUM* Hoffm.

Dioicous; stems creeping, subpinnate, branches suberect, attenuated. Leaves crowded, divergent, broadly cordate-ovate, gradually pointed, serrated, nerved above half-way. Capsule longish ovate, cernuous, lid rostrate. (T. XCIX, B.)

SYN.—*Hypnum strigosum* HOFFM. Deutsch. fl. ii, 76 (1796). WEB. MOHR Bot. Tasch. 321 (1807). WAHLENB. Fl. lapp. 381 (1812). ROEHL. Deutsch. fl. iii, 110 (1813). SCHWÆG. Suppl. I, P. II, 268 (1816). SCHULTZ Fl. starg. suppl. 79 (1819). FUNCK Moost. 63, t. 46 (1821). BRID. Bry. univ. ii, 446 (1827). HUEBEN. Musc. germ. 662 (1833). DE NOT. Syllab. 17 (1838). RABENH. D. kr. fl. II, S. 3, 283 (1848). C. MUELL. Synops. ii, 428 (1851). WILS. Bry. Brit. 353 (1855). BERK. Handb. br. m. 90 (1863). HOBK. Synops. 152 (1873). BOUL. Musc. Fr. 116 (1884). LESQ. JAMES Moss. N. Amer. 351 (1884).

*Hypnum thuringicum* BRID. Musc. rec. II, P. II, 99, t. 3, f. 2 (1801), Sp. musc. II, 14 (1812), Mant. 164 (1819). P. BEAUV. Prodr. 71 (1805).

*Hypnum pulchellum* HEDW. Sp. musc. 265, t. 68, f. 1—4 (1801).

*Hypnum velutinoides* VOIT in STURM D. Fl. II, pt. 11 (1810), Musc. herbip. 99 (1812).

*Eurhynchium strigosum* BR. SCH. Bry. eur. fasc. 57—61, t. 1 (1854). SCHIMP. Synops. 550 (1860), 2 ed. 663. MILDE Bry. siles. 300 (1869). HOBK. Synops. 2 ed. 203 (1884). HUSN. Musc. gall. 334, t. 96 (1893). DIX. JAMES. Stud. Handb. 424 (1896). LIMPR. in RAB. D. kr. fl. Laubm. iii, 157 (1897).

*Rhynchostegium strigosum* DE NOT. Cronaca II, 11 (1867), Epilogo 80 (1869).

*Rhynchostegium Progelii* SAUTER Fl. Herzog. Salz. iii, 62 (1870).

Dioicous; resembling *H. velutinum*, in flat stiff, slightly glossy yellowish-green tufts. Stem creeping with descending stolons, interruptedly pinnate, branches erect slender; paraphyllia roundish, serrate. Stem leaves divergent, ovato-cordate, gradually narrowed to an acute point, sharply serrulate, indistinctly sulcate, nerve slender,  $\frac{3}{4}$  length of leaf and ending at back in a short point, cells very narrow, about 10 times long as wide, angular cells few, quadrate and oval. Branch-leaves lanceolate with a short more or less obtuse point, indistinctly sulcate, sharply serrate. Perich. bracts squarrose, inner lanceolate, suddenly ending in a recurved serrate subula, nerve faint or none. Seta red, smooth, capsule horizontal, subcylindric, reddish-brown, lid conic, shortly rostrate; peristome brown, inner yellow. Male plantlets nestling on the radicles of the female.

HAB.—Wet banks, tree roots and rocks in shady places, rare. Fr. 12—1.  
Cornwall (*Rev. Mr. Tozz*) in Herb. Hooker.

Var. *β. præcox* (*Hedw.*) *Wahlenb.*

Stem short nearly bare; branches short erect, with closely imbricated broadly ovate short-pointed leaves, not plicate, the margins in the upper half somewhat recurved, basal angular cells few, uppermost leaves obtuse.

SYN.—*Hypnum præcox* HEDW. Sp. musc. 249, t. 64 (1801.) WEB. MOHR Bot. Tasch. 322. BRID. Sp. musc. II, 160; Mant. 168; Bry. univ. ii, 588. SCHWABG. Suppl. I, P. II 216. HUEBEN. Musc. Germ. 622.

*Leskea fasciculosa* HEDW. Sp. musc. 217, t. 54.

*Hypnum abbreviatum* SCHLEICH. Cent. IV. No. 25.

*Hypnum strigosum* Var. *præcox* WAHLENB. Fl. suec. 703.

*Eurhynchium strigosum β. imbricatum* Bry. eur. fasc. 57—61, t. 1 *β.* SCHIMP. Synops. 550, 2 ed. 664.

*Eurhynchium præcox* DE NOT. in Piccone Elenco musch. lig. No. 29.

*Rhynchostegium præcox* DE NOT. Cronaca II, p. 11, Epilogo 81.

*Eurhynchium strigosum* Var. *obtusifolium* HAMPE in BROCKM. Laubm. Meckl. 125.

HAB.—Dry banks, rocks and walls. Red sandstone rocks, Fern, Brechin (*Rev. J. Fergusson*), creeping among other mosses.

This moss is strangely absent from Britain, for we have no certain locality for the species, yet both it and its variety are found through the whole of N. Europe as well as in the central regions down to the Alps.

#### 9. *HYPNUM CIRCINATUM* Brid.

Dioicous; stems suberect, arcuate, subpinnate, branches curved downwards. Leaves crowded ovate-acuminate, serrulate, nerved nearly to apex. Seta smooth, capsule cernuous, ovate curved, lid rostrate. (T. XCIX, C.)

SYN.—*Hypnum circinatum* BRID. Sp. musc. II, 148 (1812); Mant. 165 (1819). C. MUELL. Synops. ii, 479 (1851). WILS. Bry. brit. 353 (1855). BERK. Handb. 90 (1863). HOBK. Synops. 153 (1873). BOUL. Musc. Fr. 114 (1884).

*Hypnum distans* BRID. Sp. musc. II, 109; Mant. 157; Bry. univ. ii, 409. SCHWABG. Suppl. I, P. II, 249 (1816).

*Hypnum strigosum* Var. *circinatum* BRID. Bry. univ. ii, 447.

*Hypnum Leskea* GREV. in Trans. Linn. Soc. xv, 347, t. 3, f. 7 (1826).

*Hypnum strigosum β. minus* DE NOT. Syll. 18 (1838).

*Hypnum Grevillei* RABEN. D. kr. fl. II, 3, p. 281 (1848).

*Eurhynchium circinatum* BR. SCH. Bry. eur. fasc. 57—61, p. 5, t. 3 (1854). SCHIMP. Synops. 551 (1860), 2 ed. 665. HOBK. Synops. 2 ed. 203 (1884). HUSN. Musc. gall. 335, t. 96 (1893). DIX. JAMESON Stud. Handb. 423 (1896). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 162 (1897).

*Rhynchostegium circinatum* DE NOT. Cronaca II, 11 (1867); Epilogo 78 (1869).

*Leskea distans* DE NOT. Epilogo 246 (1869).

*Leskea circinata* LINDB. in litt.

Dioicous; in depressed, dull deep green rigid tufts; stems creeping, stoloniform, subpinnate. Branches short, fascicled, circularly curved when dry. Leaves crowded; cauline cordate-ovate, broad-pointed, nerved nearly to apex, feebly plicate, margin finely serrate all round; branch-leaves oval-lanceolate, acute, closely imbricated when dry, margin recurved at base; cells very short, apical very small, oval, median rhomboidal, basal numerous, rounded-quadrate. Perichætical bracts squarrose, inner lanceolate, acuminate, serrulate in upper half, with a slender nerve; seta short purple, smooth, capsule cernuous, subcylindric, curved, lid conic, obliquely rostrate, peristome pale brown.

HAB.—Limestone rocks and walls near the S.W. coast of England; ster.

Tyfrý, Anglesey (Wilson). About Bristol (*Thwaites*)!! Helston, Cornwall (*Rev. C. A. Johns*). Near Plymouth (*Holmes*)!! Innisfallen (*Hunt*, 1867)!! Hayle Sands (*Curnow*). Dorking (*Mitten*).

A Mediterranean moss, very rare in fruit, and differing from all the other species in its small leaf-cells. Schimper's *Scorpiurium rivale* is a robust variety found on rocks in streams.

#### 10. *HYPNUM PALLIDIROSTRE* A. Braun.

Dioicous; stem creeping, filiform, subpinnate, branches very slender, subcomplanate. Leaves very small, ovate spreading serrulate, nerved half-way. Perichætical bracts very small, erect, seta rough, capsule roundish-ovate, cernuous, lid rostrate. (T. XCIX, D.)

SYN.—*Hypnum Swartzii*  $\beta$ . minus TURN. Musc. hib. 151, t. 14, f. 2 (1804).

*Hypnum prælongum* Var. *pallidirostrum* BRID. Bry. univ. ii, 767 (1827).

*Hypnum pallidirostrum* BRAUN in litt. C. MUELL. Synops. ii, 413 (1851).

*Hypnum pumilum* WILS. in Eng. Bot. Suppl. t. 2942 (1843), et Bry. brit. 351 (1855) BERK. Handb. 88 (1863). HOBK. Synops. 156 (1873). BOULAY Musc. Fr. 110 (1884).

*Eurhynchium prælongum*  $\beta$ . *pumilum* BR. SCH. Bry. eur. fasc. 57—61, p. 8, t. 7,  $\beta$ . (1854).

*Eurhynchium pumilum* SCHIMP. Coroll. 119 (1856), Synops. 561 (1860), 2 ed. 675. MILDE Bry. siles. 307 (1869). HOBK. Synops. 2 ed. 205 (1884). HUSN. Musc. gall. 341, t. 98 (1893). DIX. JAMES. Stud. Handb. 419 (1896). LIMPR. in RABEN. D. kr. Fl. Laubm. iii, 194 (1897).

*Rhynchostegium pumilum* DE NOT. Cronaca II, 12 (1867), Epilogo 87 (1869).

Dioicous; very small and slender, resembling *Ambly. serpens*, in small interwoven tufts, soft, bright or yellowish green, not glossy. Stems creeping filiform, laxly pinnate, branches divergent on two sides, with slender points. Stem leaves lax, erecto-patent, not decurrent, rather concave, opaque, ovato-lanceolate with long points, flat at margin, minutely serrulate; nerve  $\frac{3}{4}$  of length, excurrent at back in a point, cells short, chlorophyllose, a few quadrate at basal angles; branch leaves lanceolate. Perichæatial bracts few, erecto-patent, inner from an ovate base suddenly long-pointed, nearly entire, nerveless. Seta red, coarsely verrucose, capsule cernuous, oval gibbous, orange-red; lid pale, convex rostrate; peristome reddish, inner yellow, papillose, cilia two. Male infl. gemmiform, bracts ovate, acute, with a short nerve or nerveless.

HAB.—Shady rocks and hedge-banks, not common. Fr. 11—3.

Near Cork (*Wilson* 1829). Romantic rocks, Matlock (*Wilson* 1833). Woodmancote, Sussex (*Borrer* 1837). Winwick quarry, Warrington (*Wilson* 1842)!! Near Bangor (*Wilson* 1843). Penzance (*Curnow* 1863)!! Bolton Abbey (*Hunt* 1863)! Torc cascade (*Carrington*). Shere, Surrey (*Capron* 1869)!! Bagley wood, Oxon (*Boswell* 1863). Bamford wood, Lancs. (*Holt*). Ingleboro and Todmorden (*Nowell*). Lyd Hole and Haughmond hill (*Hamilton*). Rolston Scar and Richmond (*Baker* 1853). Middleton, Warwick (*Bagnall*), and many other places.

Often mistaken for *H. Teesdalei* but very different in habit and easily separated by the short nerve.

## 11. HYPNUM PRÆLONGUM L.

Dioicous; stem arched, pinnate or sub-bipinnate with attenuated branches, and simple stolons. Stem-leaves widely cordate, acuminate squarroso-recurved, branch-leaves lanceolate-acuminate, all nerved above half-way and serrate. Capsule oval-oblong subcernuous, lid with a long beak. (T. XCIX, E.)

SYN.—*Muscus vulgaris flagellis tenuibus, foliis minimis*, Doody, RAY Synops. App. 244 (1690).

*Muscus terrestris parvus supinus, Filicis modo interdum pematius* RAY Synops. 2 ed. 38 (1696).

*Hypnum repens filicinum, triangularibus parvis foliis prælongum* DILL. Cat. Giss. 219 (1718), et in RAY Synops. 3 ed. 80 (1724), Hist. musc. 278, t. 35, fig. 15A (1741), et Herbar.

*Hypnum prælongum* L. Sp. pl. 1125 (1753). HUDS. Fl. angl. 422 (1762). LIGHTF. Fl. scot. ii, 751 (1777). RELHAN Fl. cant. 411 (1785). SIBTH. Fl. oxon. 295 (1794). SWARTZ Musc. suec. 54 (1799). BRID. p. p. musc. rec. II, P. II, 82 (1801). Sp. musc. II, 102 (1812), Mant. 156 (1819). Bry. univ. ii, 399 (1827). SMITH Fl. brit. 1299 (1804), Eng. Bot. t. 2035. TURN. Musc. hib. 160 (1804). WEB. MOHR Bot. Tasch. 336 (1807). SCHWAB. Suppl. I, P. II, 277 (1816). HOOK. TAYL. Musc. br. p. p. 103 (1818). GRAY Nat. arr. Br. pl. i, 760 (1821). WILS. Bry. brit. 348 (1855). BERK. Handb. Br. m. 87 (1869).

*Hypnum pseudo-delicatulum* RADDI in Opusc. scient. Bologna II, 360,



*Hypnum orthorhynchum* BRID. Sp. musc. II, 106 (1812).

*Eurhynchium Stokesii* BR. SCH. Bry. eur. fasc. 57—61, Mon. 10, t. 8 (1854). SCHIMP. Synops. 562 (1860), 2 ed. 1876. MILDE Bry. siles. 307 (1869). HUSN. Musc. gall. 339, t. 98 (1893). LIMPR. in RABENH. Laubm. iii, 192 (1897).

*Rhynchostegium Stokesii* DE NOT. Epilogo. 85 (1869).

*Hypnum Stokesii* C. MUELL. Synops. ii, 448 (1851). HOBK. Synops. 156 (1873).

*Eurhynchium prælongum* HOBK. Synops. 2 ed. 206 (1884). BRYHN Explor. Bryol. in valle Norv. Stoerdalen 59 (1893). DIX. JAMES. Stud. Handb. 416 (1896).

Dioicous; in spreading entangled, bright yellowish-green tufts; stems fragile, arched, slightly radiculose, pinnate or sub-bipinnate, with long simple rigid squarrose-leaved stolons, branches in two rows, slender, pointed, longest below and decreasing in length upward. Stem-leaves distant, squarrosely recurved, decurrent, triangular-cordate, suddenly contracted into a long channelled point, sharply serrate all round, only somewhat recurved at the concave wings, nerve thin, vanishing below apex in a thorn-like point at back; cells at basal angles numerous enlarged and subrectangular, above narrow and linear. Paraphyllia numerous, deltoid-lanceolate, eroso-serrate. Branch-leaves close erectopate, ovato-lanceolate, acuminate acute, sharply serrate. Perichætium squarrose, bracts pale, nerveless, gradually narrowed into a recurved strap-shaped sharply serrate subula; seta long slender red, rough with obtuse tubercles. Capsule brown, horizontal, leptodermous, oblong somewhat ventricose, subcylindric when dry; lid nearly as long as capsule, conic with a long pale beak curved downward or upward; annulus of two rows of cells; peristome orange, the teeth with long pale points, inner yellow with 2 cilia. Male plants smaller with gemmiform infl., the bracts recurved at point, nerveless.

HAB.—Wet shady woods and moist hedge-banks, common. Fr. 11—2.

Var. *β. Stokesii* (Turn.) Brid.

Lurid green, with slender flagella from lower part; stems bipinnate, branches densely crowded, stem-leaves wider, shorter and less acuminate.

SYN.—*Hypnum Stokesii* Turn. Musc. hib. 159, t. 15, f. 2 (1804). HOBK. Synops. 156.

*Hypnum prælongum* Var. *Stokesii* BRID. Sp. musc. II, 103. WILS. Bry. Brit. 348.

*Eurhynchium prælongum* Var. *β. Stokesii* HOBK. Synops. 2 ed. 206. DIX. JAMES. Stud. Handb. 416.

HAB.—Shady rocks by streams in subalpine districts, not common.

Ireland, near Lough Bray (*Dr. Stokes*). Cromagloun, Killarney (*Wilson*). Arklow, Wicklow. Clonmel, Tipperary. Rockingham, Roscommon. Afon Ro, Conway (*Wilson*)!! Lyndale, N. Devon (*Nowell* 1864). Old wall at Bedgelert (*Hunt* 1861)!!

Great confusion exists as to the true *H. prælongum* of Linnæus, increased by the fact that the plant so named in his herbarium is represented by *Ambl. riparium*, yet Lindberg assured me that all the Scandinavian specimens he had seen in the old herbaria were the same as our common British plant, which undoubtedly was that of Linnæus. This was the view of all British botanists, until Schimper in the *Bryologia Europæa*, called our moss *Eurhynchium Stokesii*, and set up as *prælongum* what is here named *distans*, in which he was followed by all continental bryologists. The subject is a difficult one to clear up satisfactorily, as this *H. distans* had not been distinguished from our *prælongum*, and much as uniformity in nomenclature is desirable, I have in this instance adhered to our old view.

## 12. HYPNUM SWARTZII Turn.

Dioicous; stems creeping, not arched, nor bipinnate, with short ascending branches. Leaves uniform, those of stem cordate acute, those of branches cordate or ovate, serrated, nerved above middle. Seta rough, capsule ovate cernuous, lid rostrate. (T. C. A.)

SYN.—*Hypnum repens filicinum, triangularibus parvis foliis* Var. *brevior* DILL. Hist. musc. 279, t. 35, fig. 15B (1741), et Herbar.

*Hypnum prælongum* HEDW. Descr. iv., 76, t. 29 (1797) p.p.

*Hypnum atrovirens* (non DICKS.) SWARTZ Musc. suec. 65 (1799).

*Hypnum Swartzii* TURN. Musc. hib. 151, t. 14, f. 1 (1804). SMITH Fl. Brit. 1293 (1804). Eng. Bot. t. 2034. WILS. Bry. brit. 349 (1855). HOBK. Synops. 156 (1873). LINDB. Musc. scand. 34 (1879).

*Hypnum prælongum* ♂. *atrovirens* BRID. Sp. musc. II, 104 (1812), Bry. univ. ii, 402 (1827). BOUL. Musc. Fr. 104 (1884).

*H. prælongum* p. p. Hook. Tayl., Huebener, Berkeley, &c.

*H. prælongum* β. *scariosum* C. MUELL. Synops. ii, 447 (1851).

*Eurhynchium prælongum* Var. *atrovirens* BR. SCH. Bry. eur. fasc. 57—61, p. 8, t. 7, γ figg. 1, 1b, 2 et 3 (1854). SCHIMP. Synops. 560 (1860), 2 ed. 674. MILDE Bry. siles. 306 (1869).

*Eurhynchium Swartzii* CURNOW in RABEN. Bryoth. n. 593 (1862). HOBK. Synops. 2 ed. 205 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 200 (1897).

*Eurhynchium atrovirens* KLINGGR. Topog. Fl. Westpr. 109 (1880).

*Rhynchostegium prælongum* Var. *Swartzii* VENT. et BOTT. Enum. crit. 7 (1884).

Dioicous; in rigid glossy dark green or blackish-green tufts. Stem creeping, often with long stolons, irregularly pinnate, with few radicles; branches in two rows, somewhat flattened. Stem-leaves close, erectopatent, shortly decurrent, cordate-ovate, long-pointed, finely serrate all around the flat margin, nerve strong, ending below the point; cells at the concave basal angles in a small group, oval and rectangular,

yellowish. Branch-leaves close, erecto-patent, concave, ovato-lanceolate, not twisting at point, sharply serrate all round; nerve  $\frac{3}{4}$  length, the point excurrent at back. Perichætical bracts squarroso-recurved, gradually long-pointed, nerveless; seta red-brown, densely verrucose. Capsule cernuous, yellowish-red, ovate; lid convex with a long deflexed yellow beak, peristome deep yellow, with long pale points. Male infl. not squarrose, bracts nerveless, inner broadly ovate, suddenly pointed.

HAB.—Moist banks and rocks, not uncommon. Fr. 12—3.

This distinct species has been regarded by Bridel and Schimper, followed by most continental authors, as a variety of *H. distans* (*prælongum* SCHIMP.), from which however it is sufficiently distinct by the habit and form of leaf. It varies considerably in the width of leaf and also in the length of its short acute point and the colour of the plants when growing among herbage in exposed places is generally more or less yellowish.

### 13. *HYPNUM SCHLEICHERI* Hedw. fil.

Dioicous; stem creeping, fasciculate-branched. Stem-leaves dense, divergent, ovato-lanceolate, acuminate, half-twisted at apex; branch-leaves lanceolate, all finely serrulate. Perich. bracts suddenly narrowed into a long serrate subula. Seta short, rough. Capsule cernuous, lid conic, rostrate. (T. C, B.)

SYN.—*Hyphnum prælongum*  $\beta$ . *abbreviatum* TURN. Musc. Hib. 160 (1804). SM. Fl. Brit. 1299 (1804). BRID. Sp. Musc. II, 103 (1812), Bry. univ. ii, 401 (1827).

*Hyphnum Schleicheri* HEDW. FIL. in WEB. MOHR. Beitr. i, 128, t. 7 (1805). BRID. Sp. musc. II, 110 (1812).

*Hyphnum filescens* BRID. Sp. musc. II, 170 (1812).

*Hyphnum prælongum*  $\zeta$  *filescens* STEUDEL Nomencl. c. 215 (1824).

*Eurhynchium prælongum*  $\zeta$  *abbreviatum* BR. SCH. Bry. Eur. fasc. 57—61, Mon. 8 & 10, t. 7, fig.  $\epsilon$  (1854). SCHIMP. Synops. 560 var.  $\delta$  (1860). HUSN. Musc. gall. 341 (1893).

*Eurhynchium abbreviatum* BROCKM. Laubm. Meckl. 126 (1869). HARTM. Skand. fl. 10 ed. (1871). SCHIMP. Synops. 2 ed. 674 (1876).

*Eurhynchium Schleicheri* MILDE Bry. siles. 306 (1869). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 202 (1897).

*Rhynchostegium Schleicheri* VENT. & BOTT. Enum. crit. 7 (1884).

*Eurhynchium Swartzii* \**abbreviatum* DIX. JAMES. Stud. Handb. 419 (1896).

Dioicous; densely tufted, glossy yellowish-green. Stem creeping, irregularly pinnate with fasciculate shoots; branches short, erect; paraphyllia none. Stem-leaves dense, divergent, slightly decurrent, ovate-lanceolate, with long points half-twisted at apex, finely serrulate,

nerved to  $\frac{3}{4}$  the length, cells very narrow, 8—12 times long as wide; branch-leaves divergent, lanceolate, acute, finely serrate, all plicate. Perich. bracts squarrose, sheathing, suddenly narrowed into a long serrate subula, with a faint nerve or none. Seta short, deep red, verrucose; capsule cernuous, reddish-brown, ovate, lid conic rostrate; peristome yellow.

HAB.—On clay soil in woods, not common. Fr. 11—2.

Shanklin Chine, I. of Wight (*Davies* 1860). Maresfield, Sussex (*Davies* 1861). Herefordshire and Monmouth (*Rev. A. Ley*). Oxford (*Boswell*). Woodchester, Stroud (*Holmes*)! Shere, Surrey (*Dr. Capron*)!! Eardisley, Hereford (*Binstead* 1893)!!

Differing much from *H. Swartzii* in habit, and in the short robust branches with densely crowded leaves, so that it is much more worthy to be retained as a species than some others of this group.

#### 14. *HYPNUM SPECIOSUM* Brid.

Synoicous; stem creeping, with erect, simple, subcomplanate branches. Leaves ovate subacuminate, serrulate, nerved nearly to apex. Seta rough, capsule ovate, tapering at base, cernuous, lid rostrate. (T. C, C.)

SYN.—*Hypnum repens filicinum, triangularibus parvis foliis, prælongum*. Var. *longior*, DILL. Hist. musc. 279, t. 35, fig. 15 C (1741) et Herbar.

*Hypnum speciosum* BRID. Sp. musc. II, 105 (1812), Mant. 156 (1819). WILS. Bry. Brit. 349 (1855). BERK. Handb. 86 (1863). HOBK. Synops. 155 (1873). BOUL. Musc. Fr. 102 (1884).

*Hypnum riparioides* Var. *speciosum* SCHWÆG. Suppl. I, P. II, 196 (1816).

*Hypnum prælongum* Var.  $\zeta$  *speciosum* BRID. Bry. univ. ii, 403 (1827).

*Hypnum Starckii* C. MUELL. Synops. ii, 432 (1851).

*Hypnum androgynum* WILS. MS.

*Rhynchostegium androgynum* BR. SCH. Bry. eur. fasc. 52—54, Suppl. t. 1 (1853).

*Eurhynchium prælongum* Var.  $\delta$ . *macrocarpum* Bry. eur. fasc. 57—61, t. 7,  $\delta$  (1854).

*Eurhynchium androgynum* SCHIMP. Corol. 119 (1856), Synops. 558 (1860).

*Eurhynchium speciosum* MILDE Bry. siles. 312 (1869). SCHIMP. Synops. 2 ed. 672 (1876). HOBK. Synops. 2 ed. 204 (1884). HUSN. Musc. gal. 340, t. 98 (1893). DIX. JAMES. 415 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 189 (1897).

*Rhynchostegium speciosum* VENT. & BOTT. Enum. crit. 7 (1884).

*Eurhynchium uliginosum* WARNST. Moosfl. Branden. 68 (1885).

Synoicous; in loose depressed tufts, bright green or yellowish green with a silky gloss. Stem rambling, irregularly branched or subpinnate; paraphyllia none. Stem-leaves lax, divergent, subscariose,

slightly decurrent, ovato-lanceolate, acute, nearly flat, not sulcate, sharply serrate; nerve slender, ending shortly below apex; cells at angles rectangular, above long and narrow. Branch-leaves similar, divergent, almost bifarious. Perichætium squarrose whitish, the bracts suddenly lanceolate, long-pointed, serrulate, nerveless. Seta red, strongly verrucose; capsule cernuous or horizontal, longish, rufous-brown, lid convex with a long beak, peristome rufous-orange.

HAB.—Wet ground in woods, stones and tree-roots; not common. Fr. 12.

Well-side, Porth Dafarch, Holyhead (*Wilson* 1830). Well at Albourne Place, Hurstpierpoint (*Mitten*)!! Henfield (*Mitten*). Kyngall Cliff, Penzance (*Curnow*)!! Thirsk, Yorkshire (*J. H. Davies*). Ainsdale, Southport (*Maratt*). Glenmeny, I. of Man (*Holt* 1881)! !

A beautiful species somewhat resembling *H. rutabulum*, but easily distinguished by its glossy bright green leaves and rostrate lid. It has now disappeared both from Albourne Place and the cliff at Penzance.

#### 15. *HYPNUM HIANΣ* Hedw.

Dioicous; laxly tufted, yellowish-green or with an opalescent gloss. Stem-leaves distant, patent, cordate, gradually pointed, sharply serrate all round, nerve  $\frac{3}{4}$  the length. Branch-leaves similar but narrower. Perichætial bracts oblong-ovate, squaroso-recurved in a narrow serrated point. Seta rough; capsule pale brown, longish-oval, lid with a yellow beak. (T. C, D. E.)

SYN.—*Hyphnum prælongum* (non L.) HEDW. Stirp. cr. iv, 76, t. 29 (1797), Sp. musc. 258 (1801). C. MUELL. Synops. ii. 446 (1851), Fl. danica t. 2619, f. 1, and of most continental authors.

*Hyphnum hians* HEDW. Sp. musc. 272, t. 70, fgg. 11—14 (1801). RICH. in MICH. Fl. Amer. bor. ii, 318 (1803). BRID. Sp. musc. II, 168 (1812), Mant. 170 (1819), Bry. univ. ii, 456 (1827). SULLIV. Musc. & Hep. Un. St. 69 (1865), Icon. Musc. 163, t. 104 (1864).

*Pterigynandrum apiculatum* BRID. Sp. musc. I, 137 (1806), Mant. 131, Bry. univ. ii, 195. SCHWAG. Suppl. I, P. I., 108.

*Hyphnum dispatatum* WILS. MSS.

*Eurhynchium prælongum* BR. SCH. Bry. eur. fasc. 57—61, p. 8, t. 6 excl. var. (1854). SCHIMP. Synops. 559 (1860), 2 ed. 673. HUSN. Musc. gall. 340 (1893). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 197 (1897).

*Eurhynchium hians* JAEGER & SAUERB. in Bericht. St. Gall. Nat. Gesell. 1878, p. 357. LIMPR. in op. c. 199. HOBK. Synops. 2 ed. 205 (1884). GROUT in Bull. of Torrey Bot. Club xxv, 234 (1898).

*Rhynchostegium prælongum* DE NOT. Cronaca II, 12 (1867), Epil. 86 (1869).

*Hyphnum* (*Eurhynchium*) *hians* HOBK. Synops. 155 (1873).

*Hyphnum distans* LINDB. Musc. scand. 34 (1879).

*Eurhynchium distans* BRYHN. Explor. 59 (1893).



Dioicous; in flat expanded lax yellowish-green tufts, sometimes with an opalescent gloss, and often closely adhering to the substratum. Stem slender creeping, stoloniform, without paraphyllia, branches irregular short distant, Stem-leaves far apart, patent, ovate or cordate, gradually tapering to a narrow rather obtuse point, finely serrulate all round; nerve thin, about  $\frac{2}{3}$  length of leaf, cells rectangular and quadrate at base, narrow above and 6—8 times long as wide. Branch-leaves ovate with a short point, patent, sharply serrate, nerved to  $\frac{3}{4}$  length, cells 6—12 times long as wide. Perichæatial bracts numerous, squarrosely recurved in a serrated ligulate subula, nerveless or with a short faint nerve; seta red, rough with obtuse warts; capsule cernuous, longish-ovate, brown, lid paler, conic, rostrate, long as capsule; annulus of two rows of cells, peristome reddish.

HAB.—On the ground among grass in limestone districts and in wet clay fields or on rotten tree-trunks, not common. Fr. 11—2.

Hurstpierpoint, Wolstonbury hill c. fr. (Mitten 1856)! Lindfield, Sussex c. fr. (Davies 1856)!! Knowle Park (Borrer)! Near Cambridge (B. Syme 1863). St. Vincent's rocks, Bristol (Wilson 1863)!! Cotterall wood (Hunt 1863)!! Kiel Den, Fife (Howie 1865)! Ballinascorney Glen, Ireland (D. Orr 1867)! Near Penzance (Curnow)

This most variable moss comes very near to *H. Swartzii* but differs in habit and form of leaf, and I think there is no doubt that Grout is right when he unites *H. distans* with it. The typical form has broadly lanceolate leaves, tapering gradually to a somewhat obtuse point, but also occurring with a more or less acute acuminate apiculus; this grows on dry limestone banks, and is of a delicate yellowish green colour. When growing in shaded marshy places it becomes prostrate, slender and attenuated and with a fuscous tinge, the opalescent gloss described probably vanishes in drying, as in *Pohlia cruda*. The perichæatial bracts also vary in being nerveless, or faintly nerved half-way, but this does not afford an important character. *H. Swartzii* is more robust and densely branched, yet it is not improbable that it will also have to be united to *H. hians*.

## 16. HYPNUM CRASSINERVE Tayl.

Dioicous; stem creeping, with erect crowded simple branches. Leaves crowded, spreading, ovate, acuminate, concave, serrated, margin reflexed, nerved above halfway. Seta rough; capsule oval, cernuous; lid with a long slender beak. (T. CI, A.)

SYN.—*Hypnum crassinervium* TAYL. MSS. et in MACK. Fl. hibern. Part 2, p. 43 (1836). WILS. Eng. Bot. Suppl. t. 2706, et Bry. Brit. 346 (1855). HOOK. Br. Fl. ii, 88 (1833). RABENH. D. kr. fl. II, S. 3, 299 (1848). C. MUELL. Synops. ii, 371 (1851). BERK. Handb. 85 (1863). HOOK. Synops. 154 (1873). BOUL. Musc. Fr. 107 (1884).

*Hypnum pachyneuron* HAMPE in sched.

*Eurhynchium crassinervium* SCHIMP. Bry. eur. fasc. 57—61, p. 14, t. 11 (1854), Synops. 555 (1860), 2 ed. 669. MILDE Bry. siles. 303 (1869). HOBK. Synops. 2 ed. 204 (1884). HUSN. Musc. gall. 337, t. 97 (1893). DIX. JAMES. Stud. Handb. 414 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 176 (1897).

*Rhynchostegium crassinervium* DE NOT. Cronaca II, 12 (1867), Epil. 83 (1869).

Dioicous; in soft glossy pale green or golden brown tufts. Stems elongated, creeping, stoloniform, with crowded, erect, dense-leaved branches, turgid when moist; paraphyllia none. Stem-leaves divergent when moist, appressed when dry, broadly ovato-lanceolate, acuminate, deeply concave, the margin plane, recurved towards base, minutely serrate; nerve stout at base, yellowish, vanishing at  $\frac{3}{4}$  the length; cells short, incrassate, with several transverse rows longish-oval at base and many longish quadrate at angles. Branch-leaves less suddenly pointed. Perichætium short, laxly imbricated, inner bracts ending in a long filiform toothed subula, with a very faint nerve; seta purple, stout, densely verrucose; capsule cernuous, longish oval, with a distinct neck, pale brown, strongly contracted below the mouth when old; lid rather short, conic, rostrate, teeth of peristome brownish-yellow, papillose above middle.

HAB.—Shady limestone rocks, not uncommon. Fr. 11.

Near Cork (Taylor 1820)! Mucruss and Kenmare (Wilson). Beaumaris and Bangor (Wilson)!! Matlock (Wilson). Lewes, Sussex (Nicholson)!! Frequent in Yorkshire.

Var. *β. tenue* Braithw.

Plants slender pale green,  $\frac{1}{2}$ —1 in. high; stems with few branches, leaves more erect, narrower and more acuminate.

SYN.—*Eurhynchium Vaucheri* (non SCHIMP.) G. DAVIES in Moss Flora of Sussex, p. 15 (Brighton Nat. Hist. Soc. 1870).

HAB.—Tillington and Clayton, Sussex (Davies)!!

*Hypnum Tommasinii* SENDT. (*Vaucheri* SCHIMP. non LESQU.) has not been found here. It has leaves gradually tapering into a long slender subula, a thin nerve reaching middle, and longer cells.

Sect. 4. RHYNCHOSTEGIELLA Schimp. Small mosses growing on rocks and stones in streams or damp walls, in flat entangled tufts. Leaves divergent in all directions, lanceolate acuminate, flat at margin, cells narrow and linear, the basal narrow and rectangular. Perichætium not squarrose, seta scabrous or rarely smooth.

#### CLAVIS TO THE SPECIES.

Seta smooth, nerve nearly reaching apex. . . .

— verrucose.

Nerve reaching apex, plants dull green, leaf-point bluntish.

— narrow, reaching half-way, plants green and glossy.

Leaves pointed, cells laxer, fusiform.

— long and fine pointed, cells narrow.

*Algirianum*.

*Teesdalei*.

*curvisetum*.  
*litoreum*.

17. **HYPNUM TEESDALEI** *Smith.*

Autoicous; in depressed dull-green tufts. Branches short erect, simple. Leaves patent, lanceolate, subserrulate, with bluntish points, nerve flat and thin nearly reaching apex. Seta rough; capsule cernuous, ovate, without a neck; lid rostrate. (T. CI, B.)

SYN.—*Hyphnum intricatum* (non SCHREB.) DICKS. Pl. crypt. fasc. 2, p. 10 excl. syn. (1790), Eng. Bot. t. 202 (1794).

*Hyphnum Teesdalei* SMITH Fl. Brit. 1291 (1804). BRID. Bry. univ. ii, 416 (1827). C. MUELL. Synops. ii, 400 (1851) p.p. WILS. Bryol. Brit. 350 (1855) p.p. BERK. Handb. 89 (1863). HOBK. Synops. 158 (1873). BOULAY Musc. Fr. 111 (1884).

*Hyphnum pachyneuron* TAYL. MSS. in Herb. Hooker.

*Eurhynchium Teesdalei* LINDB. in Journ. Linn. Soc. Bot. xiii, 66 (1872). SCHIMP. Synops. 2 ed. 676 (1876). HOBK. Synops. 2 ed. 206 (1884). HUSN. Musc. gall. 342 (1893). DIX. JAMES. Stud. Handb. 420 (1896).

*Rhynchostegiella Teesdalei* LIMPR. Laubm. iii, 217 (1897).

Autoicous; in depressed dull dark green tufts. Plants very small, rigid, irregularly branched. Stem-leaves distant, patent, ovato-lanceolate, subentire, with a thin nerve; branch-leaves lanceolate, with a blunt point, remotely serrulate in the upper half, nerve flattened and vanishing in the apex. Cells chlorophyllose, spindle-shaped, at base rectangular with a few quadrate at angles. Perichætical bracts few erect, lanceolate, nerveless, not passing beyond the vaginula; seta purple erect or flexuose, coarsely verrucose; capsule slightly cernuous, ovate, brown, without any neck, lid as long as capsule, convex at base, rostrate. Teeth of peristome lanceolate-subulate, yellow, incurved. Male infl. gemmiform, bracts lanceolate, entire, nerveless.

HAB.—On stones and rocks in small streams, not common. Fr. 3—5.

Matlock Bath, Derbyshire (*Teesdale*). Bantry (*Miss Hutchins*). Belfast (*Templeton*). Mill Dingle, Beaumaris (*Wilson*)!! Rigg-mill beck, Whitby (*Braithwaite*)!! Sedbergh, Yorks. (*Pinder*). Thornton gill, Ingleton (*Nowell* 1865)!! Lover's leap, Buxton (*Hunt* 1867). Dunottar, Banchovy (*Sim* 1870). Sluice at Ashley mill (*Hunt*)! Underbarrow mill and Sedgwick, Westmoreland (*Stabler* 1872)! Lymm, Cheshire (*Holt* 1889)!! Easington beck and Roxby, Yorks. (*R. Barnes* 1889)!!

This moss is more aquatic than the other species of this group, growing on ledges of mountain limestones in streams, and hence often damaged by abrasion. The rigidity of the plants and their dark colour are also striking. Limpricht has described the species of this section with his usual clearness and has pointed out an important character in the relation between the length of the vaginula and its enclosing bracts.

18. **HYPNUM CURVISETUM** *Brid.*

Autoicous; yellowish-green, rather glossy, with short ascending branches. Leaves erecto-patent, narrow, lanceolate, acute, nerve slender, reaching middle of leaf; cells laxer narrowly fusiform. Seta rough, cygneous; capsule with a distinct neck, longish ovate, lid rostrate. (T. CI, C.)

SYN.—*Hypnum curvisetum* BRID. Sp. musc. II, 111 (1812).

*Hypnum Schleicheri* Var.  $\beta$ . *curvisetum* SCHWÆG. Suppl. I, P. II, 241 (1816). BRID. Bry. univ. ii, 404 (1827).

*Hypnum tenellum* (non DICKS.) SCHWÆG. Suppl. II, P. I, 161, t. 144 (1823).

*Hypnum laxopinnatum* BRID. Bry. univ. ii, 405 ut synonym. (1827).

*Hypnum rutabulum* Var. *tenerrimum* BRID. Bry. univ. ii, 488.

*Hypnum Schleicheri* SPRENG. (L.) Syst. veg. 16 ed. iv, P. I, 208 p.p. (1827). DE NOT. Syllab. 32 (1838).

*Hypnum Teesdalei* (non SM.) HUEBEN. Musc. germ. 618, p.p. (1833).

*Hypnum Tencriffæ* MONT. Hist. nat. Iles-Can. Crypt. 3, t. 3 (1840).

*Hypnum rigidulum* BRUCH MS. RABEN. D. kr. fl. II, S. 3, 286 (1848).

*Rhynchostegium Teesdalei* BR. SCH. Bry. eur. fasc. 49—51, p. 6, t. 3, excl. syn. (1852). SCHIMP. Synops. 566 (1860). DE NOT. Epilogo 87 (1869).

*Eurhynchium Teesdalei* MILDE Bry. siles. 313 p.p. (1869).

*Hypnum* (*Rhynchostegium*) *curvisetum* LINDB. in Journ. Lin. Soc. Bot. xiii, 68 (1872).

*Rhynchostegium curvisetum* SCHIMP. Synops. 2 ed. 681 (1876).

*Eurhynchium curvisetum* HUSN. Musc. gall. 341, t. 98 (1893). DIX. JAMES. Stud. Handb. 420 (1896).

*Rhynchostegiella curviseta* LIMPR. in RAB. D. kr. fl. Laubm. lii, 211 (1897).

Autoicous; in closely interwoven softish tufts, bright or yellowish green, rather glossy. Stems prostrate, irregularly pinnate, with short ascending equal branches, having a few rounded or lanceolate paraphyllia at base. Stem-leaves erecto-patent, narrowly lanceolate, acute, flat and entire at margin; nerve slender, vanishing about middle; cells without chlorophyl, rectangular at base, narrow and fusiform above. Branch-leaves similar, faintly serrate. Perichæatial bracts pale, erect, inner twice the length of the cylindric vaginula, ovate with long acute points, nerveless. Seta red, cygneous above, coarsely verrucose; capsule horizontal or ascending, with a distinct neck, longish ovate, pale brown; lid pale, conic rostrate; teeth of peristome yellow, inner with 1—2 cilia.

HAB.—Wet shady rocks and stones; rare. Fr. 1—2.

Hurstpierpoint (*Mitten*)! Wakehurst, Sussex (*Davies* 1856)!! Near Wells and Wormiston, Somerset (*Binstead* 1886)!!

This moss was confounded with *Teesdalei* on the continent, but it is really much nearer to *litoreum*, from which it differs chiefly by the form of the leaf; this tapers into an acute point, obscurely serrated, and not acutely acuminate, the leaf-cells also being longer and laxer. It was first found by Bridel, at Rome in 1806.

### 19. *HYPNUM LITOREUM* De Not.

Autoicous, resembling *R. Algirianum*; stem creeping with short erect branches. Leaves spreading, lanceolate, acuminate, entire, nerve vanishing at middle. Inner perichæatial bracts long and lanceolate, entire; seta rough with small tubercles; capsule oval with a tapering neck, lid rostrate. (T. CI, D.)

SYN.—*Hypnum litoreum* DE NOT. Syllab. 31 (1838).

*Rhynchostegium mediterraneum* JURAT. in Verh. zool-bot. Gesells. Wien xxiv, 378 (1874).

*Rhynchostegium curvisetum* Var. *litoreum* VENT. & BOTT. Enum. crit. 7 (1884).

*Rhynchostegium litoreum* BOTTINI in N. Giom. bot. ital. xxii, 260 (1890).

*Rhynchostegium scabrellum* MITT. Mss.

*Eurhynchium tenellum*  $\beta$ . *scabrellum* DIX. JAMES. Stud. Handb. 421 (1896).

*Rhynchostegiella litorea* LIMPR. in RABENH. D. kr. fl. Laubm. iii, 214 (1897).

Autoicous; in small entangled bright green glossy tufts. Stem creeping, irregularly pinnate with short erect branches. Stem-leaves divergent, elongate lanceolate, tapering into long fine points, flat and entire, nerve slender, reaching middle of leaf; basal cells rectangular, upper narrow, incrassate. Branch-leaves smaller becoming more elongated towards the apex, where they are often secund. Perichæatial bracts  $1\frac{1}{2}$  times length of vaginula, erecto-patent, pale, the 3 inner elongated lanceolate, entire, nerveless; seta arched at top, red, moderately rough with small tubercles, sometimes the upper half and more rarely the whole is quite smooth. Capsule horizontal, castaneous, oval with a short neck; lid convex, rostrate, yellowish, teeth of peristome, narrow lanc.-subulate, yellow.

HAB.—Near the S. coast, on sandstone and trunks of trees. Fr. 1—3.

Hurstpierpoint (*Mitten* 1861)!! On stumps and branches of trees, Ashcombe, Lewes (*W. E. Nicholson* 1896)!! Near Uxbridge (*Benbow*).



The *H. litoreum* DE NOT. has generally been regarded as a synonym of *H. curvisetum*, but the Marquis Bottini had detected the difference, and Limpricht with his usual minuteness clearly established the species. Mitten also had in the meantime detected a species which he named *scabrellum*, and he having kindly sent me an original specimen from De Notaris (Cagliari, 1835), I was able to confirm Limpricht's determination. There is one unusual point about it, the seta is sometimes found to be quite smooth, and thus somewhat lowers the importance of the character derived from a smooth or rough seta, still I look upon it as quite distinct from *H. Algirianum*.

## 20. HYPNUM ALGIRIANUM Brid.

Autoicous; stem creeping with short erect branches. Leaves erecto-patent, lanceolate, longly acuminate, entire, nerve vanishing below apex. Capsule longish-ovate, seta smooth, lid rostrate. (T. CI, E.)

SYN.—*Pterigynandrum Algirianum* BRID. Musc. rec. II, P. I, 65, t. VI, f. 7 (1798). P. BEAUV. Prodr. 86 (1805).

*Hypnum tenellum* DICKS. Pl. crypt. Fasc. IV, p. 16, t. II, f. 12 (1801). TURN. Musc. hib. 170 (1804). SMITH Fl. Brit. 1308 (1804), Eng. Bot. t. 1859. HOOK. TAYL. Musc. Brit. 93 (1818). SCHWAEGL. Suppl. II, P. I, 161, t. 144 (1823). GRAY Nat. arr. i, 754 (1821). HOOK. Fl. Scot. P. II, 142 (1821). HUEBEN. Musc. germ. 676 (1833). DE NOT. Syllab. 9 (1838). RABENH. D. kr. fl. II, S. 3, 286 (1848). C. MUELL. Synops. ii, 396 (1848). WILS. Bry. brit. 357 (1855). BERK. Handb. 96 (1863). HOBK. Synops. 157 (1873).

*Hypnum exiguum* BLAND. Cr. exsicc. Fasc. II, 93 (1805).

*Hypnum Algirianum* BRID. Spec. musc. II, 162 (1812), Mant. 168 (1819), Bry. univ. ii, 592 (1827). SCHWAEGL. Suppl. I, P. II, 240 (1816). FUNCK Moostasch. 61, t. 43 (1821). BOULAY Musc. Fr. 99 (1884).

*Rhynchostegium tenellum* BR. SCH. Bry. eur. fasc. 49-51, p. 5, t. 2 (1852). SCHIMP. Synops. 565 (1860), 2 ed. 680. HOBK. Synops. 2 ed. 207 (1884). DE NOT. Epilogo 75 (1869).

*Rhynchostegium Algirianum* LINDB. Bidr. t. Mossorn. Syn. 29 (1863).

*Eurhynchium tenellum* MILDE Bry. siles. 308 (1869). HUSN. Musc. gall. 342, t. 98 (1893). DIX. JAMES. Stud. Handb. 421 (1896).

*Rhynchostegiella tenella* LIMPR. in RABEN. D. kr. fl. Laubm. iii, 209 (1897).

Autoicous; in silky yellowish-green interwoven patches. Stem slender, creeping, with close erect short slender branches. Leaves equal, erecto-patent lax, the upper often secund, narrowly lanceolate-acuminate, with long fine points entire, nerve extended nearly to point; cells 10—15 times long as broad, all basal quadrato-rectangular. Perich. bracts erect, inner twice length of vaginula, nerveless, longish ovate, suddenly long-pointed. Seta red, slender, arcuate at top, smooth; capsule horizontal, longish-ovate, with a short neck, reddish-brown, lid yellow, conic with an oblique beak, annulus broad of two

rows of cells, teeth lanceolate-subulate, yellow. Male infl. ovate, bracts few entire, nerveless.

HAB.—Limestone rocks and walls. Fr. ro.

This pretty species is distinguished by its long narrow leaves and long nerve which is generally in the long narrow acumen, but sometimes only reaches to  $\frac{3}{4}$  the length of leaf; the leaf-cells are also very long and narrow.

Sect. 5. RHYNCHOSTEGIUM *Schimp.* Robust mosses, growing on walls and stones in water or damp shady places. Stem creeping with scattered branches or stolons. Leaves spreading on all sides, from a narrow slightly decurrent base, ovate, pointed, sometimes rounded or with an apiculus, concave, not plicate, with a strong nerve, cells uniform, linear, not vesicular or hyaline at angles, but quadrate. Seta smooth, straight, capsule oval or longish-ovate, cernuous, lid conic with a subulate beak.

#### CLAVIS TO THE SPECIES.

leaves ending in a long filiform point.	
Branching pinnate, leaves spreading.	<i>piliferum.</i>
Branches nearly simple, leaves imbricated.	<i>cirrosum.</i>
— oval or oval-oblong.	
Leaves twisted when dry, median cells wide and short.	<i>rotundifolium.</i>
— not twisted when dry, — linear.	
Leaves broadly oval, pointed.	
Aquatic, leaves serrated, spreading.	<i>rusciforme.</i>
Not aquatic, leaves imbricated, concave.	<i>murale.</i>
Leaves acuminate.	
With a broad short acumen.	<i>confertum.</i>
With a long slender acumen.	<i>megapolitanum.</i>

#### 21. *HYPNUM PILIFERUM* Schreb.

Dioicous; stem procumbent, rambling, pinnate with slender branches; leaves dense, ovato-elliptic with long piliform acumen, serrulate, nerved to middle. Seta rough, capsule ovate-oblong, cernuous, lid rostrate. (T. CII, A.)

SYN.—*Hyphnum piliferum* SCHREB. Spic. fl. Lips. 91 (1771). ROTH Tent fl. germ. i, 456 (1788). HEDW. Musci frond. iv, 35, t. 14 (1794), Sp. musc. 27 (1801). HOFFM. Deutsch. fl. ii, 75 (1795). SWARTZ Musc. succ. 65 (1799). BRID. Musc. rec. II, P. II, 162 (1801), Sp. musc. II, 187 (1812), Mant. 173 (1819), Bry. univ. ii, 489 (1827). SMITH Fl. Brit. 1319 (1804), Eng. Bot. t. 1516. TURN. Musc. hib. 175 (1804). P. BEAUV. Prodr. 68 (1805). WEB. MOHR Bot. Tasch. 315 (1807). VOIT Musc. herb. 102 (1812) et in STURM Deutsch. Fl. II, 12. WAHLENB. Fl. Carp. 362 (1814). ROEHL. Deutsch. fl. iii, 109 (1813). SCHWÆG. Suppl. I, P. II, 239 (1816). HOOK. TAYL. Musc. Brit. 105 (1818). GRAY Nat. arr. i, 761 (1821). FUNCK Moost. 60, t. 43 (1821). HOOK. Fl. Scot. P. II, 145 (1821). HUEBEN. Musc. germ. 634 (1833). RABENH. D. kr. fl. II, S. 3, 298 (1848). C. MUELL. Synops. ii, 369 (1851). WILS. Bry. brit. 347 (1855). BERK. Handb. 86 (1863). HOBK. Synops. 154 (1873). BOULAY Musc. Fr. 106 (1884).

*Hyphnum cassubicum* DICKS. Pl. crypt. Fasc III, 10 (1793).

*Eurhynchium piliferum* BR. SCH. Bry. Eur. fasc. 57—61, p. 16, t. 13 (1854). SCHIMP. Synops. 557 (1860), 2 ed. 671. MILDE Bry. siles. 304 (1869). HOBK. Synops. 2 ed. 204 (1884). HUSN. Musc. gall. 339, t. 97 (1893). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 188 (1897). DIX. JAMES. Stud. Handb. 414 (1896).

*Rhynchostegium piliferum* DE NOT. Cronaca II, 11, (1867), Epilogo 82 (1869).

*Cirriphyllum piliferum* GROUT in Bull. Torrey Bot. Club xxv. 225 (1898).

Dioicous; in lax irregular bright or pale green glossy tufts. Stem depressed, elongated, spreading, without stolons, irregularly divided, arched and pinnate with divergent branches and no paraphyllia. Stem-leaves crowded, erecto-patent, decurrent, broadly ovate, rounded at apex and extended into a long filiform subula, very concave, not plicate, distantly serrulate, nerved to middle; cells pointed, linear-rhomboid above, laxer, transparent and rectangular at decurrent angles. Branch-leaves smaller with a long acute acumen. Perichæatial bracts erect at base, squarrosely recurved, the inner longly subulate, nerveless, faintly serrate, seta purple, verrucose; capsule cernuous, with a distinct neck, longish-oval, fulvous, incurved when dry, lid conic, subulate, annulus broad; teeth yellow, red at base, cilia 2—3, filiform. Male plants less branched, infl. ovate, bracts nerveless.

HAB.—Shady woods and grassy places, not common. Fr. rare, 3—4.

A fine moss, readily known by its straggling growth and leaves suddenly tipped by a long flexuose subula.

## 22. HYPNUM CIRROSUM *Schwaeg.*

Dioicous; stems erect or procumbent, with long simple or sparingly branched shoots, turgid, cylindric. Leaves imbricated, elliptic-oblong, with flexuose filiform points, concave, nerved to middle. Seta rough, capsule ovate, lid conic-rostellate. (T. CII, B.)

SYN.—*Hypnum cirrosum* SCHWÆG. in SCHULTZ Reise auf der Glockner ii, 365 (1804), Suppl. I, P. II, 214 (1816). BRID. Sp. musc. II, 130 (1812), Mant. 174 (1819), Bry. univ. ii, 495 (1827). FUNCK Moost. 57, t. 39 (1821). HUEBEN. Musc. germ. 647 (1833). RABENH. D. kr. fl. II, s. 3, 288 (1848). C. MUELL. Synops. ii, 377 (1851). WILS. Bry. brit. 347 (1855). BERK. Handb. 87 (1863). HOBK. Synops. 154 (1873).

*Eurhynchium Vaucheri* β. *julaceum* BR. SCH. Bry. eur. fasc. 57—61, p. 15, t. 12 β. (1854).

*Brachythecium cirrosum* SCHIMP. Synops. 696 (1860), 2 ed. 806. MOLENDO Moos-Stud. Algauer Alp. 92 (1865), et Bay. Laubm. 246 (1875). HOBK. Synops. 2 ed. 201 (1884).

*Brachythecium Funckii* SCHIMP. Synops. 697 (1860).

*Myurium* ? *herjedalicum* SCHIMP. Synops. 696, 2 ed. 808.

*Hypnum herjedalicum* HARTM. Skand. Fl. 9 ed.

*Eurhynchium Vaucheri* β. *cirrosum* LORENTZ Bry. Notizb. 70 (1865).

*Brachythecium Molendoi* SCHIMP. in litt. MOL. Moos-Stud. 92 (1865).

*Rhynchostegium cirrosum* et *Funckii* DE NOT. Cronaca II, 12 (1867), Epilogo 82 (1869).

*Eurhynchium histrio* MOL. Bayern. Laubm. 224 (1875).

*Hypnum Tommasinii*  $\beta$ . *julaceum* BOULAY Musc. Fr. 109 (1884).

*Hypnum (Scleropodium) cirrosum* BOULAY op. c. 121.

*Eurhynchium cirrosum* HUSNOT Musc. gall. 338, t. 97 (1893). DIX. JAMES. stud. Handb. 413 (1896). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 182 (1897).

*Cirriphyllum cirrosum* GROUT in Bull. Torrey Bot. Club xxv, 223 (1898).

Dioicous; in soft glossy pale yellowish-green tufts. Stem decumbent, stoloniferous, the shoots turgid julaceous, simple or with few short acute branches. Leaves imbricated and appressed, cochleariform-concave, slightly decurrent, longish oblong-ovate, abruptly contracted into a long subulate point, margin involute above, indistinctly denticulate, nerve vanishing at or below middle, sometimes forked; cells linear above, incrassate and quadrato-hexagonal at angles; lower leaves fuscous, smaller and narrower, acutely pointed, nerveless. Perichætal bracts longish, nerveless, suddenly contracted into a recurved serrulate subula; seta purple, verrucose, capsule horizontal, gibbous-oval, castaneous, annulus of 3 rows of irregular cells, lid acute, conico-rostellate, peristome yellow. Male plant unknown.

HAB.—Mountain rocks. Summit of Ben Lawers (*Dr. Arnott* 1823)!!

The branches resemble *H. purum*, but the leaves are like those of *H. piliferum*; the fruit is very rare but has been found in the Tyrol, Bavaria and Switzerland, and by the short lid approaches *Brachythecium*. Limpricht describes three distinct varieties, and several other forms appear to exist.

### 23. *HYPNUM RUSCIFORME* Neck.

Autoicous; in deep green, rigid tufts. Stem decumbent or floating, with long arched branches. Leaves spreading, broadly ovate, serrated, nerved nearly to apex. Seta smooth; capsule ovate, cernuous; lid rostrate. (T. CII, C.)

SYN.—*Hypnum repens, triangularibus minoribus foliis, pediculis et capitulis brevioribus et tumidioribus majus* DILL. in RAY Synops. 3 ed. 80 (1724).

*Hypnum foliis rusciformibus, capsulis subrotundis* DILL. Hist. musc. 298, t. 38, fig. 31 A (1741) et Herbar.

*Hypnum aquaticum, flagellis et teretibus, et pennatis* DILL. Hist. musc. 308, t. 40, fig. 44 A—C, et Herbar.

*Hypnum rusciforme* NECK. Delic. gallo-belg. ii, 481 (1768). WEISS Crypt. Goett. 225 (1770). LIGHT. Fl. Scot. ii, 746 (1777). ROTH Fl. Germ. i, 466 (1788). SCHRANK Baiers. fl. ii, 477 (1789). BRID. Musc. rec. II, P. II, 173 (1801), Sp. musc. II, 190 (1812), Mant. 174 (1819), Bry. univ. ii, 497 (1827). P. BEAUV. Prodr. 69 (1805). SCHULTZ Fl. Starg. 334 (1806). DE NOT. Syllab. 34 (1838). C. MUELL. Synops. ii, 425 (1851). BOULAY Musc. Fr. 94 (1884).

*Hyphnum ruscifolium* NECK. Act. acad. theod.-palat. ii, 453 (1770), Meth. musc. 181 (1771). WITHER. Bot. arrang. ii, 683 (1776). SIBTH. Fl. oxon. 297 (1794). ABBOT Fl. Bedf. 246 (1798). HULE Br. Fl. P. 2, 269 (1799). SMITH Fl. Brit. iii, 1292 (1804). Eng. Bot. t. 1275. TURN. Musc. hib. 153 (1804). MART. Fl. cr. Erl. 21 (1817). HOOK. TAYL. Musc. Br. 106 (1818). HOOK. Fl. scot. P. 2, 145 (1821). GRAY Nat. arrang. i, 761 (1821). VOIT in STURM Deutsch. Fl. II. fasc. 13. HUEBEN. Musc. germ. 626 (1833). RABENH. D. kr. fl. II, S. 3, 626 (1848). WILS. Bry. brit. 354 (1855). BERK. Handb. 92 (1863). HOBK. Synops. 159 (1873).

*Hyphnum aquaticum* POLLICH Pl. Palat. n. 1026 (1777).

*Hyphnum riparioides* HEDW. Descr. iv, 10, t. 4 (1793), Sp. musc. 242 (1801). ROTH Fl. germ. iii, P. 1, 321 (1800). WEB. MOHR Bot. Tasch. 326 (1807). VOIT Musc. herbip. 101 (1812). ROEHL. Deutsch. fl. iii, 100 (1813). SCHWAEGL. Suppl. I, P. II, 195 (1816). FURCK Moost. 56, t. 38 (1821).

*Hyphnum rivulare* EHRH. Pl. crypt. n. 252 (1793). HOFFM. Deutsch. fl. ii, 78 (1795).

*Rhynchostegium rusciforme* BR. SCH. Bry. eur. fasc. 49-51, p. 11, t. 9 (1852). SCHIMP. Synops. 572 (1860), 2 ed. 686. DE NOT. Epilogo 71 (1869). HOBK. Synops. 2 ed. 208 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 230 (1897).

*Eurhynchium rusciforme* MILDE Bry. siles. 312 (1869). HUSNOT Musc. gall. 346, t. 100 (1893). DIX. JAMES. Stud. Handb. 426 (1896).

Autoicous; in lax tufts, decumbent or floating, rigid, dark green and glossy. Stem bare of leaves at base, with many small-leaved stolons and long ascending arched branches. Lowest leaves distant, ovate, recurved, long-pointed and nerveless. Stem-leaves erecto-patent, from a narrow decurrent base, ovate, gradually pointed or bluntish, flat at margin and serrated, nerve strong, vanishing below apex; cells chlorophyllose, at base and angles bistratose, hexagono-rectangular, above long and fusiform. Perichæatial bracts ovate, sheathing at base, divergent, inner with long points, nerveless; seta purple, smooth; capsule with a distinct neck, ovate cernuous; lid conic with a strong beak, annulus of two rows of cells; peristome rufous, paler at points, papillose, inner yellow.

HAB.—On stones in streams, common. Fr. 11.

Var. *β. Atlanticum* Bridel.

Stems elongated, branches bent downward, arcuate; leaves large somewhat secund, with short points or obtuse, cells elongated.

SYN.—*Hyphnum Atlanticum* BRID. Musc. rec. II, P. II, 121, t. 4.

*H. rusciforme* *δ. Atlanticum* BRID. Bry. univ. ii, 499.

*Rhynchostegium rusciforme* *β. Atlanticum* Bry. eur. l.c. t. 10, fig. *β*. 1—2, 4—8.

Ditto *β. lutescens* SCHIMP. Synops. 2 ed. 687.

HAB.—By waterfalls and in mountain streams.

Var. *γ. inundatum* Brid. Bry. univ. ii, 500.



Stems repeatedly divided, flexuose prostrate, with many dense-leaved branches. Leaves spreading, broad, ovate-oblong, elongated, gradually short-pointed.

SYN.—*Hypnum inundatum* BRID. Musc. rec. II, P. II, t. 5, fig. 3.

*Rhynchostegium rusciforme* Var.  $\gamma$ . *inundatum* Bry. eur. l.c. t. 10,  $\gamma$ . 1—6.

HAB.—By sides of streams.

Var.  $\delta$ . *prolixum* (Dicks.) TURN.

Stem floating, divided into many very long flagelliform branches, with few lateral shoots. Leaves divergent, broadly ovato-lanceolate, alternately large and small, gradually acutely pointed.

SYN.—*Hypnum palustre erectum praelongum, minus ramosum, latioribus et triangularibus foliis* DILL. Cat. Giss. 219.

*Hypnum aquaticum prolixum, foliis ovatis* DILL. Hist. musc. 298, t. 38, f. 32.

*Hypnum riparium*  $\beta$ . WEBER Spic. fl. Goett. 81.

*Hypnum prolixum* DICKS. Pl. crypt. Fasc. II, 13.

*Hypnum ruscifolium*  $\beta$ . *prolixum* TURN. Musc. hib. 153.

*Rhynchostegium rusciforme* Var. *prolixum* Bry. eur. l.c. t. 10, f.  $\beta$ . 3.

HAB.—In deep water courses in limestone districts.

## 24. HYPNUM MURALE Neck.

Autoicous; stem creeping, with crowded erect turgid branches. Leaves imbricated, erecto-patent, roundish-ovate, very concave, entire, nerved half-way. Capsule ovate, lid rostrate. (T. CIII, A.)

SYN.—*Hypnum myosuroides brevius et crassius, capsulis cernuis* DILL. Hist. musc. 318, t. 41, f. 52 (1741) et Herb.

*Hypnum vulgare, dentatum, operculis cuspidatis* DILL. op. c. 297, t. 38, f. 30 A, et Herb.

? *Hypnum clavellatum* L. Sp. pl. 1130 (1753).

*Hypnum murale* NECK. Del. Gallo.-Belg. ii, 479 (1768). HEDW. Descr. iv, 79, t. 30 (1797). Sp. musc. 240 (1801). WITHER. Bot. arrang. 3 ed. iii, 861 (1796). SWARTZ Musc. succ. 67 (1799). BRID. Musc. rec. II, P. II, 103 (1801), Sp. musc. II, 157 (1812), Mant. 168 (1819), Bry. univ. ii, 586 (1827). ROTH Fl. germ. iii, P. 1, 318 (1800). SMITH Fl. brit. 1304 (1804). TURN. Musc. hib. 166 (1804). SCHULTZ Fl. starg. 320 (1806). WEB. MOHR. Bot. Tasch. 323 (1807). ROEHL. Deutsch. fl. iii, 111 (1813). VOLT Musc. herb. 110 (1812). SCHWABG. Suppl. I, P. II, 198 (1816). HOOK. TAYL. Musc. brit. 98 (1818). FUNCK Moost. 57 (1821). GRAY Nat. arrang. i, 755 (1821). HOOK. Fl. scot. P. 2, 143 (1821). HUEBEN. Musc. germ. 623 (1833). DE NOT. Syllab. 37 (1838). RABENH. D. kr. fl. II, S. 3, 285 (1848). C. MUELL. Synops. ii, 346 (1851). WILS. Bry. brit. 356 (1855). BERK. Handb. 93 (1865). HOBK. Synops. 159 (1873). BOULAY Musc. Fr. 98 (1884).

*Hypnum velutinum*  $\beta$ . *murale* NECK. Meth. 172 (1771).

*Hypnum abbreviatum* HEDW. Sp. musc. 249, t. 65 (1801).

*Rhynchostegium murale* BR. SCH. Bry. eur. fasc. 49—51, p. 10, t. 8 (1852). SCHIMP. Synops. 571 (1860), 2 ed. 685. DE NOT. Epilogo 74 (1869). HOBK. Synops. 2 ed. 208 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 227 (1897).

*Eurhynchium murale* MILDE Bry. siles. 310 (1869). HUSNOT Musc. gall. 346, t. 100 (1893). DIX. JAMES. Stud. Handb. 427 (1896).

Autoicous; in dense flat shining yellowish-green tufts, firmly adherent to the substratum and with numerous erect short simple turgid branches. Stem leaves densely imbricated, concave, ovate, narrowed at base, rounded at point and ending in a short apiculus, margin entire or minutely denticulate at apex; nerve thick at base, vanishing a little above middle; cells at base rectangular, hyaline, at angles lax hexagono-rectangular, upper fusiform. Perichæatial bracts erect with recurved points, inner ovate-acuminate, nerveless, seta purple smooth; capsule cernuous ovate-oblong with a small neck, rufous, lid conico-rostrate, annulus of two rows of cells; teeth rufescent, endostome yellow with two cilia.

HAB.—On rocks, stones and walls in limestone districts. Fr. 12—2.

Var. *β. complanatum* (Br. Sch.).

Stouter with fewer branches which are lax long and flattened. Leaves smaller, pointed, scarcely concave.

SYN.—*Rhynchostegium murale β. complanatum* Bry. eur. l.c. fig. 8 *β*. SCHIMP. Synops. 571 2 ed. 686.

*Rhynchostegium confertum* Var. *elatior* MOLEND in LORENTZ Moosstud. 109.

HAB.—On wet rocks.

Var. *γ. julaceum* (Br. Sch.) Bry. eur. l.c.

Whitish green, with julaceous branches. Leaves densely imbricated, obtuse, cochleariform.

HAB.—On dry walls.

A neat moss varying in density, in form of leaf and also in colour, sometimes having a rufescent tinge. Its favourite locality is at the damp bases of stone walls.

## 25. *HYPNUM CONFERTUM* (Dicks.) Br. Sch.

Autoicous; in lax bright green tufts; stems creeping, subpinnate with erect branches. Leaves crowded, sub-complanate or erecto-patent, sometimes subsecund, ovato-acuminate, nerved half-way, distantly and feebly serrate. Seta smooth, capsule cernuous, ovate, lid rostrate. (T. CIII, B.)

SYN.—*Hypnum confertum* DICKS. Pl. crypt. fasc. IV, 17, t. 11, f. 14 (1801). SMITH Fl. brit. 1304 (1804); Eng. Bot. t. 1262. WEB. MOHR Bot. Tasch. 329 (1807). BRID. Sp. musc. II, 106 (1812), Mant. 157 (1819), Bry. univ. ii, 405 (1827). ROEHL. Deutsch. Fl. iii, 111 (1813). SCHWÆG. Suppl. I, P. II, 199, t. 90 (1816). HOOK. TAYL. Musc. br. 106 (1818). HOOK. Fl. scot. P. II, 145 (1821). FUNCK Moost. 57, t. 38 (1821). GRAY Nat. arr. i, 762 (1821). HUEBEN. Musc. Germ. 624 (1833). RABENH. D. kr. fl. II, s. 3, 287 (1848). C. MUELL. Synops. ii, 345 (1851). WILS. Bry. Br. 355 (1855). BERK. Handb. 93 (1863). HOBK. Synops. 158 (1873). BOULAY Musc. Fr. 96 (1884).

? *Hypnum serrulatum* HEDW. Sp. musc. 238, t. 60 (1801). SMITH Fl. Brit. 1250. TURN. Musc. hib. 148 (1804).

*Hypnum Ludwigii* SPRENG. Anl. z. Kennt. Gew. iii, 297, t. 7, f. 56 (1804). BRID. Sp. musc. II, 146.

*Leskea Ludwigii* BRID. Sp. musc. II, 61 (1812).

*Hypnum late-virens* SM. Eng. Bot. t. 2553.

*Rhynchostegium confertum* BR. SCH. Bry. eur. fasc. 49—51, p. 7, t. 4 (1852). SCHIMP. Synops. 568 (1860), 2 ed. 683. DE NOT. Epilogo 72 (1869). HOBK. Synops. 2 ed. 208 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 224 (1897).

*Eurhynchium confertum* MILDE Bry. siles. 309 (1869). HUSN. Musc. gall. 344, t. 99 (1892). DIX. JAMES. Stud. Handb. 428 (1896).

Autoicous; in bright green patches, with creeping subpinnate stems and short erect branches. Stem-leaves erecto-patent, from a narrow base, ovate, pointed, margin recurved at base, distantly serrulate, nerve reaching  $\frac{2}{3}$  its length; cells rectangular at base, narrow and elongated above. Branch-leaves more or less complanate so as to appear in two rows, often subsecund, narrowly ovato-lanceolate, more or less acuminate, minutely serrate. Perich. bracts sheathing, ovato-lanceolate, suddenly extended into a long serrated point, with a very slender nerve; seta reddish, smooth, capsule ovate-oblong, brownish, cernuous, strongly contracted below mouth when dry, lid convex, rostrate, peristome yellow. Male infl. small, the bracts nerveless.

HAB.—On stones and trunks of trees, common. Fr. 9—10.

A neat moss, varying little in habit, but the leaf points are sometimes extended into a fine acumen, and occasionally are more or less obtuse. When sterile it is liable to be taken for a small form of *H. rutabulum*, but with fruit the smooth seta and rostrate lid at once distinguish it.

## 26. HYPNUM MEGAPOLITANUM Blandow.

Autoicous; in lax straggling pale green tufts. Stem-leaves lax, ovate gradually extended into a subulate point, feebly serrate, nerved  $\frac{2}{3}$  the length. Perich. bracts recurved and suddenly subulate; capsule cylindraceous, lid rostrate. (T. CIII, C.)

SYN.—*Hypnum megapolitanum* BLAND. Exs.c. III, No. 147 (1804), et in STURM Deutsch. fl. II, 9 (1809). WEB. MOHR Bot. Tasch. 326 (1807). BRID. Sp. musc. II, 187 (1812), Mant. 173 (1819), Bry. univ. ii, 491 (1827). ROEHL. Deutsch. fl. iii, 111 (1813). SCHWÆG. Suppl. I, P. II, 241 (1816). MART. Fl. cr. Erl. 24 (1817). FUNCK Moost. 61, t. 43 (1821). SPRENG. (L.) Syst. veg. 16 ed. iv. 209 (1827). HUEBEN. Musc. germ. 636 (1833). RABENH. D. kr. fl. II, S. 3, 287 (1848). C. MUELL. Synops. ii, 353 (1851). BERK. Ilandb. br. m. 94 (1863). HOBK. Synops. 158 (1873). BOULAY Musc. Fr. 95 (1884).

*Hyphnum confertum* Var. *megapolitanum* BRUCH MS. WILS. Bry. brit. 356 (1855).

*Rhynchostegium megapolitanum* BR. SCH. Bry. eur. fasc. 49—51, p. 8, t. 5 (1852). SCHIMP. Synops. 569 (1860), 2 ed. 684. DE NOT. Epilogo 73 (1863). HOBK. Synops. 2 ed. 208 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 220 (1897).

*Eurhynchium megapolitanum* MILDE Bry. siles. 311 (1869). HUSN. Musc. gall. 345, t. 99 (1892). DIX. JAMES. Stud. Handb. 429 (1896).

Autoicous; in very lax soft pale yellowish green tufts, the stems depressed, with distant irregular branches and a few short ramuli. Stem-leaves glossy, lax, erecto-patent, narrow and slightly decurrent at base, ovate, gradually extended into a subulate point, margin recurved at base, feebly serrate, nerve yellowish  $\frac{2}{3}$  the length, cells laxer at base, quadrate and hyaline at angles. Branch-leaves lanceolate, acuminate, sharply serrate. Perich. bracts suddenly recurved and subulate from the middle, faintly toothed, nerve slender. Seta purple, smooth, flexuose, capsule longish cylindric, pale brown, curved, lid conic rostrate, peristome orange, processes widely cleft.

HAB.—Sandy grassy places by the sea, rare. Fr. 1—3.

Shoreham beach and Newhaven (Mitten)!! Southport (Marrat)!! Hayle sands (Curnow 1866)!! Malahide, Dublin (Moore 1860). Crosby warren (Wilson 1835)!! St. Andrews (Howie).

Although generally compared with *H. confertum*, this is a more robust plant with a very different facies, and longer setæ and capsule, and with us mostly affects the vicinity of the sea.

## 27. HYPNUM ROTUNDIFOLIUM Scop.

Autoicous; in lax depressed dark green tufts, with scattered branches. Leaves distant, divergent, twisted and crumpled when dry, cauline longish ovate with a short point, feebly toothed above, nerved to middle, cells very lax, hexagonal, uniform. Capsule cernuous, olivaceous, oval, lid rostrate. (T. CIII, D.)

SYN.—*Hyphnum rotundifolium* SCOP. Fl. Carn. 2 ed. 62 (1772). BRID. Musc. rec. II, P. II, 129 (1801). Bry. univ. ii. 768 (1827). C. MUELL. Synops. ii. 245 (1851). BOULAY Musc. fr. 98 (1884).

*Hyphnum confertum*  $\beta$ . *rotundifolium* BRID. Sp. musc. II, 107 (1812), Bry. univ. ii, 407 (1827).

*Hyphnum intextum* (non VOIT) HUEBEN. Musc. germ. 621 (1833).

*Rhynchostegium rotundifolium* BR. SCH. Bry. eur. fasc. 49—51, p. 9, t. 7 (1852). SCHIMP. Synops. 570 (1860), 2 ed. 685. DE NOT. Epilogo 71 (1869). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 222 (1897).

*Eurhynchium rotundifolium* MILDE Bry. siles. 310 (1869). HUSN. Musc. gall. 345, t. 99 (1892). DIX. JAMES. Stud. Handb. 429 (1896).

Autoicous; in depressed, soft, opaque dark green tufts. Stem creeping, stoloniform, with scattered branches. Leaves distant, patent, twisted and crumpled when dry, cauline narrow at base, ovate or broadly obovate, suddenly narrowed into a small point, distantly denticulate above, nerved

to middle; cells uniform, very lax, longish hexagonal, branch-leaves elliptic with a short point. Perichætium laxly imbricated, bracts longish ovate, acuminate, nerveless; seta short, red, smooth. Capsule cernuous, oval with a short neck, olivaceous-brown, lid orange, conical with a long curved beak; annulus broad, teeth lanceolate-subulate rufous, endostome yellow. Male infl. gemmiform, bracts ovate, pointed, nerveless.

HAB.—On stones in old hedge-rows and damp shaded walls; very rare.

Fr. 12—2.

Base of an old hedge near Wells, Somerset (*Binstead*).

A very distinct species, readily known by its dark green crumpled leaves with large lax cells. It is apt to disappear by the growth of weeds and nettles among the stones and rubbish to which it is attached.

[NOTE.—*Rhaphidostegium* SCHIMP. is synonymous with Mitten's genus *Sematophyllum*, and is more appropriately placed in the *Stereodontæ*.]

Sect. 6. BRACHYTHECIUM *Schimp*. Growing in lax creeping tufts, the stems irregularly or pinnately branched. Leaves spreading on all sides, glossy, ovate or lanceolate, pointed, serrulate, often plicate, nerved to middle or more; cells rhomboid or linear, smooth, quadrato-hexagonal at angles. Seta verrucose or smooth. Capsule cernuous, short and gibbous; lid convex-conic, obtuse or with a short point, peristome perfect.

This large section is a very natural one, comprising above 100 species, some of which may be arranged in closely allied minor groups, which are difficult to discriminate from each other in a sterile state. This applies forcibly to the allies of *H. glaciale* (*Starkei*, *curtum*, *campestre*, &c.), and for these I have followed Limpricht's detailed descriptions, without being quite satisfied as to the distinctness of all.

#### CLAVIS TO THE SPECIES.

Seta roughish in upper half, smooth below.

Leaves multiply.

—— not plicate, entire.

Nerved half-way.

—— nearly to apex.

—— rough throughout.

Nerve reaching half-way.

Stem-leaves decurrent, triangular-cordate, suddenly long-pointed.

—— broadly ovate, suddenly short-pointed, glossy.

—— scarce decurrent, broadly ovate, short-pointed, faintly plicate, autoicous.

—— small, ovato-lanceolate, not plicate.

—— broadly ovate, with a short point, multiply, dioicous.

Nerve reaching nearly to apex.

Stem-leaves longly decurrent, triangular-cordate, not plicate.

—— slightly decurrent, broadly ovate, faintly plicate.

—— smooth.

Leaves erecto-patent, serrate, nerved to middle.

——, serrulate at subulate point, nerved above middle.

—— erecto-appressed, long-pointed, entire.

*campestre*.

*pseudoplumosum*.  
*viride*.

*Starkei*.  
*curtum*.

*rutabulum*.  
*velutinum*.

*rivulare*.

*reflexum*.  
*glaciale*.

*plumosum*.

*glareosum*.  
*albicans*.



28. *HYPNUM VELUTINUM* L.

Autoicous; stems creeping, with short erect branches. Leaves spreading, ovato-lanceolate, acuminate, serrulate in upper half, nerved above half-way. Seta rough, capsule ovate, cernuous; lid conical, apiculate. (T. CIII, E.)

SYN.—*Muscus terrestris*, *vulgaris minor*, *Adianti aurei capitulis* RAY Synops. 18 (1690).

*Hypon repens trichodes terrestre viridius minus, capitulis tumidioribus cernuis* DILL. Cat. Giss. 216 (1718), et in RAY Synops. 3 ed. 84 (1724).

*Hypon velutinum capsulis ovatis cernuis* DILL. Hist. musc. 326, T. 42, f. 61 (1741) et Herb.

*Hypon velutinum* L. Sp. plant. 1129 (1753). HUDS. Fl. Angl. 428 (1762). WEISS Crypt. Goett. 225 (1770). NECK. Meth. musc. 172 (1771). WITHER. Bot. arrang. ii, 689 (1776). LIGHTF. Fl. scot. ii, 763 (1777). WEBER Spic. Fl. Goett. 96 (1778). RELHAN Fl. Cantab. 416 (1785). ROTH Fl. Germ. i, 471 (1788). SIBTH. Fl. Oxon. 301 (1794). HOFM. Deutsch. fl. ii, 85 (1795). HEDW. Musc. frond. iv, 70, t. 27 (1797), Sp. musc. 272 (1801). SWARTZ Musc. succ. 66 (1799). BRID. Musc. rec. II, P. II, 105 (1801), Sp. musc. II, 166 (1812), Mant. 169 (1819), Bry. univ. ii, 457 (1827). SMITH Fl. Brit. 1305 (1804), Eng. Bot. t. 2421. TURN. Musc. Hib. 167 (1804). SCHULTZ Fl. Starg. 300 (1806). WEB. MOHR Bot. Tasch. 310 (1807). WAHL. Fl. lapp. 381 (1812), Fl. carp. 362 (1814). ROEHL. Deutsch. fl. iii, 108 (1813). HOOK. TAY. Musc. br. 105 (1818). HOOK. Fl. scot. P. II, 145 (1821), Br. Fl. ii, 89 (1833). FUNCK. Moost. 61, t. 44 (1821). GRAY Nat. arr. Br. pl. i, 761 (1821). HURBEN. Musc. germ. 637 (1833). DE NOT. Syllab. 25 (1838). RABENH. D. kr. fl. II, S. 3, 299 (1848). C. MUELL. Synops. ii, 399 (1851). WILS. Bry. Brit. 342 (1855). BERK. Handb. 79, t. 5 (1863). HOBK. Synops. 149 (1873). BOULAY Musc. Fr. 126 (1884). LESQ. JAMES MOSS. N. Amer. 339 (1884).

*Hypon intricatum* SCHREB. Spic. Fl. Lips. (1771).

*Leskea velutina* SCHRANK Baier. Fl. iii, 461 (1789).

*Brachythecium velutinum* BR. SCH. Bry. eur. fasc. 52—54, p. 5, t. 4 (1853). SCHIMP. Synops. 536 (1860), 2 ed. 648. DE NOT. Epilogo 125 (1869). MILDE Bry. Siles. 331 (1869). HOBK. Synops. 2 ed. 198 (1884). HUSN. Musc. gall. 329, t. 95 (1892). DIX. JAMES. Stud. Handb. 406 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 103 (1896).

*Hypon declivum* MITT. Journ. Lin. Soc. viii, p. 33, t. 6 (1865).

Autoicous; in depressed interwoven bright green tufts, slightly glossy. Stem creeping, irregularly pinnate, branches curved, ascending. Stem-leaves lax and spreading, from a narrow base, ovato-lanceolate, acuminate in a long point, nerve slender,  $\frac{3}{4}$  length of leaf, margin plane, almost entire, basal angular cells few, quadrate, upper long and narrow; branch-leaves divergent, narrowly lanceolate, margin plane, distantly serrate, nerved above half-way. Perich. bracts pale, erecto-patent, inner ovate, serrate, with a long subulate point; seta purple, coarsely verrucose, capsule cernuous and horizontal, gibbous ovate, glossy brown, lid convex-conic, pointed, annulus of two rows, teeth lanceolate-subulate, orange, papillose at point. Male infl. gemmiform, the bracts acuminate, serrate at point, nerveless.

HAB.—On grassy banks, stones and in woods, very common. Fr. 12—4.

Var. *β. praelongum* Schimp. Bry. eur. f. 52—54, t. 4, fig. *β*.

In large pale or bright green patches, not glossy. Stems elongated, slender, with distant bifarious branches, the leaves distant, longer and narrower, capsule longer.

HAB.—Shady woods. Conham, Bristol (*Thwaites*, 1841) !!

Var. *γ. intricatum* (*Hedw.*)

SYN.—*Hypnum intricatum* HEDW. Descr. iv, 73, t. 28 (1797). BRID. Bry. univ. ii, 461.

Tufts smaller, dense, interwoven, glossy. Stems short, with numerous branches incurved at apex. Leaves crowded, secund, subfalcate, narrower, more serrated. Seta short, capsule short, roundish.

HAB.—On rocks and in clay fields, not uncommon.

One of our commonest mosses, varying much in habit and colour. When growing on damp shaded walls it is often of a blackish green tint.

## 29. *HYPNUM PSEUDOPLOSUM* Brid.

Autoicous; in dense bright green tufts, subpinnae. Leaves crowded erecto-patent, subsecund, ovate-acuminate, concave, entire or serrulate at apex, nerved above half-way. Seta rough in upper half, capsule cernuous, ovate, lid conical, acute. (T. CIV, A.)

SYN.—*Hypnum plumosum* (non HUDS. nec HEDW.) SWARTZ Disp. musc. suec. 66 (1799). SMITH Fl. Brit. 1310 (1804), Eng. Bot. t. 2071. TURN. Musc. hib. 98, t. 25 (1804). HOOK. TAYL. Musc. br. 98 (1818). FUNCK Moostasch. t. 43, f. 38 (1821). SCHWAEGL. Suppl. III, P. I, t. 225 (1827). HUEBEN. Musc. germ. 642 (1833). WILS. Bry. br. 340 (1855). BERK. Handb. 82, t. 5, f. 3 (1863). HOBK. Synops. 151 (1873). BOULAY Musc. Fr. 131 (1884).

*Hypnum pseudoplosum* BRID. Musc. rec. II, P. II, 108 excl. syn. (1801), Sp. musc. II, 159 (1812), Mant. 170 (1819), Bry. univ. ii, 472 (1827). P. BEAUV. Prodr. 68 (1805). C. MUELL. Synops. ii, 350 (1851).

*Hypnum flagellare* (non DICKS.) HEDW. Sp. musc. 282, t. 73, f. 1—3 (1801).

*Hypnum chrysostomum* MICHX. Fl. Bor.—Amer. ii, 319 (1803).

*Hypnum alpinum* SMITH Eng. Bot. t. 1496.

*Brachythecium plumosum* BR. SCH. Bry. Eur. fasc. 52—54, p. 4, t. 3 (1853). SCHIMP. Synops. 545 (1860), 2 ed. 657. DE NOT. Epilogo 120 (1869). MILDE Bry. sil. 335 (1869). HOBK. Synops. 2 ed. 201 (1884). LESQ. JAMES Moss. N. Amer. 345 (1884). HUSN. Musc. gall. 326, t. 94 (1892). DIX. JAMES. Stud. Handb. 407 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 87 (1896).

*Brachythecium Maximilianum* GUEMB. Moosf. Rheinpf. 87 (1857).

*Brachythecium Molendoi* (non SCHIMP.) LORENTZ in SAUT. Fl. Herzog. Salz. iii, 60 (1870).

Autoicous; in large glossy bright green tufts. Stems depressed, pinnate, with simple erect or curved branches. Stem-leaves crowded, erecto-patent, somewhat decurrent, ovato-lanceolate, shortly acuminate, not plicate, entire with plain margins, often subserrulate at apex and subsecund, nerve reaching above middle; cells rectangular at base,

quadrate at angles, oval above. Branch-leaves erecto-patent, lanceolate, serrated above. Perich. bracts sheathing in lower half, then suddenly recurved, lanceolate-subulate, entire nerveless, or occasionally a faint nerve is present in lower third of some bracts; seta purple, rough in upper half, smooth at base; capsule cernuous, rather small, oval, gibbous, glossy-brown, turning black when old, lid acutely conical, peristome yellow. Male infl. ovate, pale, the bracts ovate, entire, inner lanceolate, obtuse.

HAB.—On rocks and stones by streams. Fr. 10—3.

Var. *β. homomallum* Schimp. Bry. eur. l. c. t. 3, *β* 1—3.

More slender, with incurved branches. Leaves falcato-secund. Capsules smaller ovate.

HAB.—By waterfalls in alpine districts.

### 30. HYPNUM VIRIDE Lamk.

Autoicous; stem creeping, subpinnae with short slender branches. Leaves erecto-patent, ovato-lanceolate, acuminate, subserrulate towards point, nerved to apex. Seta rough in upper half; capsule subcernuous, roundish ovate, lid conical, acute. (T. CIV, B.)

SYN.—*Hypnum viride* LAMARCK Encyc. Meth. bot. iii, 181 (1789), Fl. Franc. i, 536.

*Hypnum implexum* SWARTZ in Act. holm. 1795, p. 264. TURN. Musc. hib. 173, t. 16 (1804). SMITH Fl. Brit. 1310 (1804), Eng. Bot. t. 1584.

*Hypnum populeum* HEDW. Sp. musc. 270, t. 70, f. 1—6 (1801). WEB. MOHR Bot. Tasch. 305 (1807). BRID. Sp. musc. II, 179 (1812), Mant. 172 (1819), Bry. univ. ii, 470 (1827). ROEHL. Deutsch. Fl. iii, 109 (1813). HOOK. TAYL. Musc. brit. 94 (1818). SCHULTZ Suppl. Fl. Starg. 77 (1819). HOOK. Fl. scot. P. 2, 142 (1821), Br. Fl. ii, 78 (1833). GRAY Nat. arrang. i, 754 (1821). FUNCK Moost. 60, t. 42 (1821). HUEBEN. Musc. germ. 641 (1833). DE NOT. Syllab. 25 (1838). RABENH. D. kr. fl. II, S. 3, 294 (1848). C. MUELL. Synops. ii, 366 (1851). WILS. Bry. Brit. 341 (1855). BERK. Handb. 82 (1863). HOBK. Synops. 150 (1873). BOULAY Musc. Fr. 125 (1884).

*Hypnum ambiguum* (SCHRAD.) SCHLEICH. Cat. WEB. MOHR Bot. Tasch. 305.

*Hypnum saxicola* VOIT in STURM Deutsch. Fl. II, fasc. 12 (1812).

*Hypnum Stereodon Laureri* FUNCK, BRID. Bry. univ. ii, 595.

*Brachythecium populeum* BR. SCH. Bry. eur. fasc. 52—54, p. 3, t. 1 & 2 (1853). SCHIMP. Synops. 544 (1860), 2 ed. 656. DE NOT. Epilogo 121 (1869). MILDE Bry. siles. 335 (1869). HOBK. Synops. 2 ed. 200 (1884). HUSN. Musc. gall. 326, t. 94 (1892). DIX. JAMES. Stud. Handb. 407 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 90 (1896).

Autoicous; in depressed bright green tufts. Stem creeping, subpinnae, with short simple branches attenuated at points; stem-leaves erecto-patent, ovato-lanceolate, acuminate, acute, entire or subserrulate towards apex, not sulcate, nerved to apex, cells longish hexagono-rectangular at base, quadrate and rectangular at angles; branch-leaves

lanceolate-subulate, finely serrate at margin, nerved to apex. Perichætal bracts squarrose, inner sheathing, lanceolate-subulate and recurved in upper half, with a faint nerve half-way; seta purple, rough in upper half; capsule cernuous, castaneous, oval, gibbous, lid conical, acute, teeth yellow.

HAB.—Damp walls and stones and on tree-roots. Fr. 1—3.

A number of varieties have been described by Schimper, but with us the plant appears to be pretty constant, but varies in colour, sometimes being of a beautiful whitish green.

### 31. *HYPNUM REFLEXUM* Starke.

Autoicous; slender, creeping, pinnate, with short incurved branches. Leaves crowded, decurrent, broadly deltoid-ovate, suddenly lanc.-subulate, serrated, nerved to point. Seta rough, capsule globose-oval, horizontal, lid conic, pointed. (T. CIV, D.)

SYN.—*Hypnum reflexum* STARKE MSS. WEB. MOHR Bot. Taschen. 306 & 476 (1807). BRID. Sp. musc. II, 170 (1812). Mant. 170 (1819). Bry. univ. ii, 461 (1827). SCHWABG. Suppl. I, P. II, 269 (1816), et II, P. I, 161, t. 143 (1823). HOOK. TAYL. Musc. brit. 95 (1818). HOOK. Fl. scot. P. 2, 142 (1821), Br. Fl. ii, 78 (1833). GRAY Nat. Arr. i, 754 (1821). FUNCK Moost. 62, t. 46 (1821). HUEBEN. Musc. germ. 639 (1833). DE NOT. Syllab. 26 (1838). RABENH. D. kr. fl. II, S. 3, 281 (1848). C. MUELL. Synops. ii, 448 (1851). WILS. Bry. brit. 342 (1835). BERK. Handb. 80 (1863). HOBK. Synops. 149 (1873). BOULAY Musc. Fr. 124 (1884). LESQ. JAMES Moss. N. Amer. 342 (1884).

*Leskea laxifolia* HOOK. Musc. exot. t. 30 (1818).

*Brachythecium reflexum* BR. SCH. Bry. eur. fasc. 52—54, p. 8, t. 5 (1853). SCHIMP. Synops. 539 (1860), 2 ed. 650. MILDE Bry. siles. 332 (1869). DE NOT. Epilogo 126 (1869). HOBK. Synops. 2 ed. 199 (1884). HUSN. Musc. gall. 327, t. 94 (1892). DIX. JAMES. Stud. Handb. 495 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 114 (1896).

*Hypnum subtenue* JAMES in Proc. Ac. Phil. 1855, p. 447.

*Rigodium reflexum* KINDB. Laubm. Schwed. u. Norw. 14 (1883).

Autoicous; in creeping interwoven dingy-green tufts, often black at base. Stems slender, filiform, rooting at points, pinnate, the branches filiform, simple and incurved. Stem-leaves crowded, divergent, from a wide decurrent deltoid base, cordate-ovate, suddenly lanceolate-acuminate, often oblique at point, not sulcate, with plain serrulate margins; nerve nearly reaching apex, cells firm, longish hexagonal at base, very numerous, small and quadrate at the excavate angles. Branch leaves ovato-lanceolate, nerved to point, serrated at margin. Perich. bracts pale, nerveless, ovato-lanceolate, subulate and squarrosely recurved, inner erect; seta purple, rough, capsule roundish-ovate, horizontal, small, blackish-brown, lid conical, acuminate. Male infl. gemmiform, ovate.

HAB.—Mountain rocks, rare. Fr. 4—5.

Ben Nevis. Ben Lawers (*Arnott*)!! Clova (*Don* 1807)!! Glen Callater (*Fergusson* 1868)!!

Var. *β. micropus* (*Schimpf.*)

Plants smaller and more slender. Leaves more gradually acuminate. Seta short, only slightly rough; calyptra large, enclosing the whole capsule, teeth of peristome perforated at apex.

SYN.—*Brachythecium micropus* SCHIMP. Bry. eur. fasc. 52—54, p. 9, t. 6, Synops. 539; 2 ed. 650.

HAB.—Ben Lawers (*Dr. Nichol* 1855)!!

The species has leaves very distinct, both in form and areolation, and the var. has still more slender stems with smaller leaves. Bottini considers *micropus* to be a hybrid between *reflexum* and *populeum*.

### 32. HYPNUM STARKEI *Brid.*

Autoicous; in trailing dark green tufts, pinnate. Stem-leaves spreading, decurrent and cordate at base, ovato-lanceolate, nerved half-way, margin serrate; cells oval-hexagonal, quadrate and rectangular at angles. Seta rough, capsule ovate, gibbous, brown; lid conical. (T. CIV, E.)

SYN.—*Hyfnum Starkei* BRID. Musc. rec. II, p. II, 107 (1801), Sp. musc. II, 166 (1812), Mant. 170 (1819), Bry. univ. ii, 595 (1827). WEB. MOHR Bot. Taschen. 310 (1807). ROEHL. Deutsch. Fl. iii, 108 (1813). SCHWÆG. Suppl. I, P. II, 251 (1816). HUEBEN. Musc. germ. 638 (1833). C. MUELL. Synops. ii, 432, p.p. (1851). BOULAY Musc. Fr. 128 (1884).

*Hyfnum reflexum* Var. *β. Starkei* HARTM. Skand. Fl. 2 ed. 346 (1832) et Var. *γ. umbratum* MYRIN Corol. Fl. ups. 45, p.p. (1833).

*Brachythecium Starkei* Var. *β. alpestre* SCHIMP. Bry. eur. fasc. 52—54, p. 10, t. 7, fig. *β.* (1853), et Var. *robustum* Synops. 540 (1860), 2 ed. 651.

*Hyfnum grimsulannum* Bry. eur. fasc. 52—54, p. 11 in obs.

*Brachythecium Starkei* MILDE Bry. Siles. 333, p.p. (1869). DE NOT. Epilogo 124 (1869). HOBK. Synops. 2 ed. 199 (1884). HUSN. Musc. gall. 327, t. 94 (1892). DIX. JAMES. Stud. Handb. 404 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 99 (1896).

Autoicous; in spreading yellowish green rather glossy tufts. Stem depressed, weak, pinnate with numerous arcuate branches, sometimes rooting at apex, and few short ramuli; stem-leaves divergent, recurved at point, decurrent and excavate at angles, cordate-ovate in lower  $\frac{2}{3}$ , then narrowed into an acute acumen, not plicate, margin plane, feebly toothed above, nerved above middle; cells at base oval-hexagonal, the angular numerous, quadrate and roundish-hexagonal, above 7—9 times as long as broad; branch-leaves dense, divergent, resembling the stem-leaves, but gradually shorter and twisted at point, not plicate, sharply serrate at margin. Perich. bracts subsquarrose, the inner sheathing and suddenly



narrowed into a recurved point, nerveless ; seta purple, rough with pointed tubercles ; capsule horizontal, brown or black when old, thick and ovate, lid hemispheric, with a conical point ; teeth reddish yellow. Male infl. thick, ovate with ovate pointed bracts.

HAB.—On rocks in alpine districts, and on rotten trees, very rare. Fr. 12—3.

Ben Lawers (*Dr. Stirton* 1858)!!

This species, *curtum* and *glaciale* have been so confused and so closely resemble each other that I have found the utmost difficulty in separating them, and unless helped by Limpricht's careful descriptions should have felt disposed to unite them. Schimper evidently did not understand them, and C. Mueller mixed up *Starkei* with *H. (Rhynchostegium) speciosum* ; from *reflexum* it is easily separated by the form of the leaf.

### 33. HYPNUM CAMPESTRE *Bruch.*

Autoicous ; in lax spreading pale green tufts. Stem spreading with ascending branches ; stem-leaves dense, erecto-patent, ovato-lanceolate, acuminate, multiplicate, nerved to middle, cells quadrate at angles. Seta rough above, smooth below, capsule cylindric, curved. (T. CV, B.)

SYN.—*Hyphnum campestre* BRUCH in schedis.

*Hyphnum rutabulum* Var. *campestre* C. MUELL. Synops. ii, 368 (1851).

*Brachythecium campestre* BR. SCH. Bry. eur. fasc. 52—54, p. 12, t. 11 (1853). SCHIMP. Synops. 543 (1860), 2 ed. 654. MILDE Bry. Siles. 334 (1869). HOBK. Synops. 2 ed. 200 (1884). LESQ. JAMES Moss. N. Amer. 344 (1884). HUSN. Musc. gall. 323, t. 92 (1892). DIX. JAMES. Stud. Handb. 402 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 83 (1896).

*Brachythecium Schimperii* KLINGGR. Hoh. Kr. Preuss. 168 (1858).

*Brachythecium Arnoldianum* MOL. in Lorentz Moosstud. 120 (1864).

*Brachythecium subalbicans* DE NOT. Cronaca II, 20 (1867), Epilogo 118 (1869).

Autoicous ; closely resembling *H. plumosum* HUDS., growing in loose irregular soft tufts, pale green and rather glossy. Stem repeatedly divided, not stoloniform, the branches distant, unequal, pointed. Stem-leaves crowded, erecto-patent, when dry loosely imbricated, elongated, ovato-lanceolate, gradually fine-pointed, irregularly sulcate, margin plane, entire or faintly serrate at point, nerved to middle ; cells thin, without chlorophyl, quadrate and rectangular at base. Branch-leaves elongate lanceolate, with two faint folds, sharply serrate above. Perichætium squarrose, the inner bracts suddenly narrowed into a long flexuose recurved subula, with a few teeth at point, and a short faint nerve ; seta red, flexuose, rough in the upper part with scattered tubercles ; capsule

cernuous, longish cylindric, curved, lid conical, teeth yellow. Male infl. gemmiform, the bracts ovate, acuminate.

HAB.—On the ground in grassy places, rare. Fr. 12—2.

Newchurch, Over, Cheshire (*Wilson* 1837). Hurstpierpoint and Maresfield, Sussex (*Mitten* 1856)!! Poynings common (*Mitten*). Wakehurst (*Davies* 1862)!!

A moss very close to *H. plumosum*, but with the aspect of *H. glareosum*, but the leaves are larger and less attenuated at points, and the seta is always more or less rough at the upper end. It very rarely bears fruit, and thus no doubt has been probably overlooked, as several other species resemble it in the form of leaf.

### 34. *HYPNUM GLACIALE* (Br. Sch.) Hartm.

Autoicous; in loose soft, creeping tufts. Stem-leaves erecto-patent, broadly-ovate, suddenly with a lanceolate subula, plicate, nerved above half-way, feebly serrate, cells quadrate and rectangular at angles. Seta rough; capsule horizontal, ovate, gibbous. (T. CV, A.)

SYN.—? *Hynum Funckii* HORNSCH. in sched. C. MUELL. Synops. ii, 429 (1851).

*Brachythecium glaciale* BR. SCH. Bry. eur. fasc. 52—54, p. 11, t. 8 (1853). SCHIMP. Synops. 541 (1860), 2 ed. 652. DE NOT. Epilogo 124 (1869). HOBK. Synops. 2 ed. 198 (1884). HUSN. Musc. gall. 328, t. 94 (1892). DIX. JAMES. Stud. Handb. 405 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 110 (1896).

*Hynum glaciale* C. HARTM. Skand. Fl. 9 ed. 9 (1864). BOULAY Musc. Fr. 128 (1884).

*Brachythecium Funckii* (non SCHIMP.) DE NOT. Cronaca II, 21 (1867), Epilogo 125 (1869).

Autoicous; in extended loose and soft yellowish-green glossy tufts. Stem creeping, with red radicles and short curved distant branches. Stem-leaves erecto-patent, loosely imbricated, from a slightly decurrent base, broadly ovate, suddenly with a somewhat oblique lanceolate point, plicate, the margin faintly serrate, recurved at base, nerve lost at  $\frac{2}{3}$  the length; cells at basal angles quadrate and rectangular. Branch-leaves subsecund, ovato-lanceolate, acute, faintly plicate, serrate. Perich. bracts erect, outer ovate, apiculate, inner sheathing, convolute, suddenly narrowed into a slender point, entire, nerveless or with a faint nerve. Seta purple, rough with blunt warts, capsule horizontal, gibbous ovate, without a neck, reddish-brown, black when old, lid long, conical, pointed; peristome brownish-yellow, inner yellow, the processes split into two legs. Male infl. small, the bracts ovate, pointed, nerveless.

HAB.—Rocks at summit of higher mountains, very rare.

Ben Lawers, on rocks, c. fr. (*Dr. Nichol* 1855)!! Ben Challum (*McKinlay* 1863)! in Herb. Schimper?

Var. *β. Huntii* Schimpf.

Loose, dark green above, blackish at base, pinnate and more robust than the type ; the stem creeping, with short distant branches. Stem-leaves larger and longer with longer points, the margin obsoletely serrate, nerve longer ; branch-leaves with longer points.

SYN.—*Brachythecium Huntianum* SCHIMP. olim.

*Brachythecium glaciale* Var. WILSON in litt.

*Brachythecium Starkei* Var.  $\gamma$ . *prælongum* SCHIMP. Synops. 2 ed. 652 p.p. (1876).

HAB.—Ben Lawers on rocks (*Hunt* 1868)!!

I have been much puzzled by so-called *H. glaciale* (British specimens), *H. curtum* and *H. Starkei*, and am disposed with Grout (Mem. Torrey Bot. Club. vi, 195) to refer them all to *Starkei*. The leaves vary notably in serration, length of nerve and of acumen on the same plant, as well as in outline of leaf, but the paucity of material prevents me studying them as fully as I could wish. McKinlay's specimen was sent to Schimper by Dr. Wood, and certainly differs from *glaciale*, but it is very small, and as McKinlay's herbarium was destroyed, I have no means of determining it.

### 35. *HYPNUM CURTUM* Lindb.

Autoicous ; in lax pale green glossy tufts. Stem pinnate with short distant arched branches. Stem leaves rather distant, loosely divergent, decurrent and ovato-cordate at base, gradually acuminate, acute, feebly serrate, cells rectangular at base ; branch leaves lax ovate, twisted at point. Seta rough ; capsule ovate, gibbous, lid conical. (T. CV, C.)

SYN.—*Hyphnum rutabulum* Var.  $\zeta$ . *explanatum* BRID. Sp. Musc. II, 184 (1812), Bry. univ. ii, 488 (1827).

*Hyphnum Starkei* FUNCK Moost. 61, t. 44 (1820).

*Brachythecium Starkei*  $\alpha$  Bryol. eur. fasc. 52—54, p. 10, t. 7 excl. Var.  $\beta$ . (1853). Var.  $\alpha$  et Var.  $\gamma$  *prælongum* SCHIMP. Synops. 540 (1860), 2 ed. 652, sec. Limpricht.

*Brachythecium Starkei* forma major MILDE Bry. siles. 333, in nota (1869).

*Brachythecium rutabulum* Var. *explanatum* BROCKM. in Arch. Ver. Freund. Naturg. Meckl. xxiii, 122 (1870).

*Brachythecium Starkei* Var. *robustum* LIMPR. Kr. fl. Schles. I, 75 (1876).

*Hyphnum curtum* LINDB. Musc. scand. 35 (1879).

*Brachythecium curtum* LINDB. Meddel. af Soc. Fn. et Fl. fenn. V. (1879). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 101 (1896).

*Brachythecium Starkei* Var. *curtum* WARNST. Moosfl. prov. Brand. 71 (1885).

Autoicous ; in very lax pale green glossy tufts with the habit of *H. rutabulum*, and also resembling *H. Starkei*, from which it differs in the leaves and is softer and more robust. Stems radiculose, stoloniform, distantly pinnate ; branches flattened, attenuated, flagelliform and

rooting at points, ramuli few. Stem-leaves distant, pale green, thin and lax, divergent, slightly excavated at angles, broadly cordate-ovate and strongly decurrent, gradually narrowed into a long point, faintly plicate, margin plane, indistinctly serrate, nerve ending about middle, sometimes forked; cells without chlorophyl, 8—14 times long as broad, wide and elongated at base, very numerous and elongated at angles. Branch leaves distant, divergent in two rows, decurrent, ovate, gradually pointed, the point twisted, sometimes turned to one side, sharply serrate all round, nerve reaching middle. Perichætium squarrose, the inner bracts sheathing, narrowed into an erecto-patent point; seta longer and thinner, red, rough, capsule horizontal, longish ovate, gibbous, somewhat curved, and a little contracted below mouth, reddish-brown, lid convex conic. Peristome yellow. Male infl. ovate, the bracts pale, ovate, suddenly pointed.

HAB.—Wet moorlands and rotten sticks on mountains. Fr. 12—2.

The above is principally drawn up from Limpricht's excellent description and from a specimen from Finland, sent by the late Prof. Lindberg, from which also the drawing was made. I have seen no British specimen, but as it is the type of Schimper's *Starkei*, it is probable it will be found. It has quite the facies of *H. rutabulum*, and is probably identical with *H. ædipodium* MITT. in Journ. Linn. Soc. viii, 32 (1865). The British *Starkei* is a smaller plant with narrower leaves, found also by Mr. Rogers on Tarmachan and Ben Laoigh. (1881)

### 36. HYPNUM RUTABULUM L.

Autoicous; stems procumbent, irregularly branched. Stem-leaves spreading, broadly ovate, short-pointed, serrulate, plicate, nerved above half-way. Seta very rough, capsule ovate-oblong, curved, cernuous; lid conical. (T. CV, D.)

SYN.—*Muscus terrestris latioribus foliis major seu vulgaris* RAY Cat. Pl. angl. ii, 208 (1677), Synops. 17 (1690).

*Muscus terrestris minor precedenti similis, omnium vulgarissimus* RAY Synops. 2 ed. 36 (1696).

*Hypnum repens triangularibus angustioribus foliis* DILL. Cat. Giss. 219 (1718).

*Hypnum dentatum vulgarissimum, operculis obtusis* DILL. Hist. musc. 295, t. 38, f. 29 (1741), et Herbar.

*Hypnum rutabulum* L. Sp. plant. 1124 (1753). HUDS. Fl. angl. 421 (1762). WEISS Crypt. Goett. 224 (1770). NECK. Meth. musc. 178 (1771). WITHER. Bot. arrang. ii, 683 (1776). LIGHTF. Fl. scot. ii, 747 (1777). WEBER Spic. fl. Goett. 91 (1778). RELHAN Fl. Cantab. 409 (1785). ROTH Fl. germ. i, 466 (1788). SIBTH. Fl. Oxon. 297 (1794). HOFFM. Deutsch. fl. ii, 77 (1795). HEDW. Musc. fr. iv, 29, t. 12 (1797), Sp. musc. 276 (1801). SWARTZ Musc. Suec. 67 (1799). BRID. Musc. rec. II, P. II, 159 (1801), Sp. musc. II, 183 (1812), Mant. 172 (1819), Bry. univ. ii, 485 (1827). SMITH Fl

Brit. 1320, excl. syn. EHRH. (1804), Eng. Bot. t. 1647, et 1261. TURN. Musc. hib. 179 (1804). SCHULTZ Fl. Starg. 302 (1806). WEB. MOHR Bot. Tasch. 304 (1807). ROEHL. Deutsch. Fl. iii, 107 (1813). SCHWABEG. Suppl. I, P. II, 248 (1816). HOOK. TAY. Musc. Brit. 105 (1818). HOOK. Fl. scot. P. 2, 145 (1821). HUEBEN. Musc. germ. 632 (1833). C. MUELL. Synops. ii, 367 (1851). WILS. Bry. Brit. 345 (1855). BERK. Handb. 80 (1863). BOULAY Musc. Fr. 129 (1884). HOOK. Synops. 149 (1873).

*Hypnum rutabuliforme* GRAY Nat. arr. Br. pl. i, 761 (1821).

*Brachythecium rutabulum* BR. SCH. Bry. Eur. fasc. 52—54, p. 11, t. 9—10 (1853). SCHIMP. Synops. 542 (1860), 2 ed. 653. MILDE Bry. Siles. 334 (1869). DE NOT. Epilogo 109 (1869). HUSN. Musc. gall. 323, t. 92 (1892). DIX. JAMES. Stud. Handb. 402 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 106 (1896).

Autoicous; in loose glossy yellowish-green tufts. Stems trailing, with irregular erect straight branches. Stem-leaves spreading from a narrow shortly decurrent base, broadly ovate, shortly pointed, faintly plicate, the margin plane, finely denticulate all round, or nearly entire, nerved to  $\frac{2}{3}$  the length; cells leptodermous, about 10 times long as broad, the basal angular oval, hyaline. Branch-leaves more divergent, gradually pointed, distantly serrulate. Perichæatial bracts squarrose, vaginant, suddenly recurved with a long subulate point, entire, nerveless; seta purple, very rough with obtuse warts. Capsule cernuous, subcylindric, curved, reddish-brown, contracted below mouth; lid convex-conic, pointed, annulus of two rows of cells, teeth purple, inner yellow with 2—3 cilia.

HAB.—On the ground, stones, walls and hedge-banks, very common.  
Fr. 12—2.

Var. *β. longisetum* Brid.

Stems and setæ elongated, the branches elongated, pinnate, lax-leaved; capsules longer and more curved.

SYN.—*Hypnum longisetum* BRID. Sp. musc. II, 183. Bry. Eur. t. 10, fig. *β*. LIMPR. op. c. 108.

HAB.—In moist pasture fields.

Var. *γ. flavescens* Schimp.

Having habit of last, stout, pale, yellowish-green, leaves broadly ovate, short pointed.

SYN.—Bry. Eur. t. 10 *γ*. LIMPR. l. c.

HAB.—Grassy banks in limestone districts.

Var. *δ. plumulosum* Schimp.

Smaller with short branches, leaves ovato-lanceolate with slender points.

SYN.—Bry. Eur. t. 10, *δ* LIMPR. l. c.

HAB.—On rotten trees.



Wallasey, Southport (*Hunt* 1864)!! Treveylor Wood, Penzance (*Curnow* 1869)!! On thatch near Edinburgh (*Dr. B. White* 1867)!!

Var. *ε. densum* Schimpf.

Stems creeping, flagelliform, pinnate with close branches, leaves crowded, laxly imbricated, dark green; seta short.

SYN.—Bry. eur. t. 10, *ε*. LIMPR. p. 109.

HAB.—On rotten wood.

Var. *ζ. robustum* Schimpf.

Stem depressed, with stout erect branches; leaves crowded, laxly imbricated, broad and concave, deep green; seta short.

SYN.—Bry. eur. t. 10, *ζ*. LIMPR. p. 109.

HAB.—Wet places in woods and by streams.

By river Foss, York (*Ingham* 1898)!! Cadley, Preston (*H. Beesley* 1900)!!

*H. rutabulum* varies very much according to environment, especially in the leaf-point and amount of serration. Several other forms occur almost as worthy to be varieties as these given above. There is no doubt it is sometimes dioicous, or polygamous, and then scarcely separable from the next species.

### 37. *HYPNUM RIVULARE* Bruch.

Dioicous; in lax rather rigid tufts. Stems elongated, arched or subpinnate, with scattered slender incurved branches. Stem-leaves spreading, deltoid-ovate, concave, plicate, finely serrated, nerved above half-way. Seta very rough; capsule roundish-ovate, cernuous, lid conical, pointed. (T. CVI, A.)

SYN.—*Hypnum chrysostomum* (non RICHARD) C. MUELL. Synops. ii, 368 (1851).

*Hypnum rivulare* BRUCH in sched. WILS. Bry. brit. 346 (1855). BERK. Handb. 81 (1863). BOULAY Musc. Fr. 122 (1884).

*Brachythecium rivulare* BR. SCH. Bry. Eur. fasc. 52—54, p. 13, t. 12 (1853). SCHIMP. Synops. 543 (1860), 2 ed. 655. MILDE Bry. Siles. 338 (1869). DE NOT. Epilogo 110 (1869). HOBK. Synops. 2 ed. 200 (1884). HUSN. Musc. gall. 322, t. 92 (1892). DIX. JAMES. Stud. Handb. 403 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 128 (1896).

Dioicous; in large bright green rigid tufts. Stems creeping, naked at base, arched, with scattered attenuated branches, or subdendroid with shorter fascicled branches. Stem-leaves patent, more decurrent, deltoid-ovate, suddenly short-pointed, concave, plicate, finely serrate at margin, excavate at angles, nerved above middle; cells longish at base, the angular elongated rectangular hyaline; branch-leaves lanceolate, gradually

pointed. Perichæatial bracts nerveless, inner suddenly subulate from middle and squarrosely recurved; seta purple very rough, capsule cernuous, castaneous, longish ovate, lid conical, acutely pointed, annulus red, peristome reddish brown, endostome yellow.

HAB.—On stones in streams and wet places in woods, especially in sub-alpine calcareous districts, frequent. Fr. 12—3.

Cotteral Wood, Manchester (*Wilson* 1828).

Var. *β. cataractarum* *Sauter*.

Dark or yellow-green; stems nearly simple, elongated, leaves more imbricated, short-pointed, with a stronger nerve, the basal angles with excavate auricles of laxer hyaline cells.

SYN.—SAUTER in RABEN. Bryoth. n. 764 (1864), et in Fl. Herzogt. Salzbg. iii, 60 (1870). LIMPR. Laubm. iii, 130.

HAB.—On submersed rocks. Aber, N. Wales (*Dixon* 1892)!!

Var. *γ. latifolium* *Husn*.

Pale green, resembling *Acrocladium cuspidatum*. Stems subpinnate with few short branches, or nearly simple, pointed at apex. Leaves decurrent, round-triangular, with an acute apiculus.

SYN.—*Brachythecium rivulare* Var. *latifolium*. HUSN. Musc. gall. 322 (1892).

HAB.—Snowdon and Scawfell Pikes (*Dixon*).

Var. *δ. tenue* *Dixon*. Handb. p. 404.

Very slender, almost prostrate, yellowish, branches short, often curved at tips; leaves small, distant, spreading widely when dry.

HAB.—Fairlight Glen, Hastings (*Jameson*).

Var. *ε. chrysophyllum* *Bagnall*. Dixon Handb. l. c.

In glossy pale yellow tufts, densely fastigate-branched; leaves large, normal in form, serratures obsolete, except at apex, margin reflexed, cells hyaline.

HAB.—Sherbrook Valley near Hednesford, Staffs. (*Bagnall* 1898)!!

Var. *γ.* does not seem to be the same as *H. latifolium* Lindberg, from whom I have a specimen; in it the apiculus is much longer, the margin recurved below, and the cells shorter and wider.

This species is very variable and in some of its forms comes very close to *H. rutabulum*, to which some authors are inclined to unite it, but it is a more

rigid rambling plant, with rather scariose leaves with many deep plaits, and the cells narrower and serpentine. The tree-like form is not seen in *H. rutabulum*.

### 38. *HYPNUM PLUMOSUM* Huds.

Autoicous; stem procumbent, pinnate. Leaves erecto-patent, ovate with long subserrulate points and many plaits, nerved above half-way. Seta smooth, capsule cernuous, ovate, curved, lid conical. (T. CVI, B.)

SYN.—*Hypnum repens filicinum pennatum* DILL. Cat. Gissen. 218 (1718).

*Hypnum repens filicinum plumosum* DILL. in RAY Synops. 3 ed. 86 (1724); Hist. musc. 280, t. 35, f. 16 (1741) et Herb.

*Hypnum plumosum* (non HEDW.) HUDSON Fl. angl. 423 (1762). BRID. Musc. rec. II, P. II, 65 (1801), Sp. musc. II, 171 (1812), Mant. 172 (1819), Bry. univ. ii, 475 (1827).

*Hypnum salebrosum* HOFFM. Deutsch. Fl. ii, 74 (1795). WEB. MOHR Bot. Tasch. 312 (1807). BRID. Sp. musc. II, 172, Mant. 172, Bry. univ. ii, 477. SCHWAEGL. Suppl. I, P. II, 237 (1816). SCHULTZ Suppl. Fl. Starg. 77 (1819). FUNCK Moostasch. t. 42, f. 31 (1821). GREV. Scott. crypt. fl. iv., t. 184 (1826). HUEBEN. Musc. Germ. 643 (1833). DE NOT. Syllab. 28 (1838). RABENH. D. kr. fl. II, S. 3, 296 (1848). WILS. Bry. Brit. 338, t. 55 (1855). BERK. Handb. 77 (1863). HOBK. Synops. 148 (1873). BOULAY Musc. Fr. 133 (1884).

*Hypnum plumosum*  $\beta$ , *salebrosum* C. MUELL. Synops. ii, 359 (1851).

*Brachythecium salebrosum* BR. SCH. Bry. eur. fasc. 52—54, p. 16, t. 15—16 (1853). SCHIMP. Synops. 532 (1860), 2 ed. 641. DE NOT. Epilogo 119 (1869). MILDE Bry. siles. 330 (1869). HOBK. Synops. 2 ed. 197 (1884). HUSN. Musc. gall. 323, t. 93 (1892). DIX. JAMES. Stud. Handb. 401 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 72 (1896).

*Brachythecium ambiguum* DE NOT. Cronaca II, 18 (1867), Epil. 112 sec. Venturi.

*Brach. jucundum* DE NOT. Cron. II, 20, et Epil. 118 sec. Venturi.

*Brachythecium texanum* AUSTIN in Bull. Torr. Club vi, 44.

*Brachythecium lævisetum* KINDB. Bull. Torr. Club xvii, 279 (1890).

Autoicous; resembling *H. rutabulum*, in depressed pale green tufts, branches subpinnate, terete, erect. Stem-leaves erecto-patent, from an ovate base, acuminate, more or less distinctly serrulate in the upper half, strongly biplicate, nerved to middle; cells rectangular at base, 8—12 times long as broad above; branch-leaves erecto-patent, lanceolate, acuminate, serrate at point. Perichæcial bracts squarrosely recurved from the middle and longly subulate, seta red, smooth; capsule oblong, cernuous, curved, brown; lid conical, pointed, teeth reddish-brown, endostome yellow. Male infl. gemmiform, the bracts erecto-patent, inner with toothed subulate points.

HAB.—On stones in woods and at tree roots, not common. Fr. 12—2.

Near Castle Howard station (*Spruce* 1847)!! Forfar (*Drummond*). St. Andrews (*Howie* 1858). Near Newton Viaduct (*Wilson* 1847).

Var.  $\beta$ . *Mildei* Schimp.

More robust, trailing, usually polygamous, in lax glossy golden green tufts, branches few, somewhat complanate. Leaves patent, straight scarcely plicate, flat and entire, broadly ovate-lanceolate, acutely acuminate, entire or with a few distant teeth toward apex.

SYN.—*Hyphnum Mildeanum* SCHIMP. Synops. 694 (1860).

*Brachythecium Mildeanum* MILDE in Bot. Zeit. 1862, p. 453; Bry. Siles. 330. LIMPR. op. c. 66.

*Hyphnum acutum* MITT. in Journ. Lin. Soc. viii, 33, t. 6 (1865). SULLIV. Icon. musc. Suppl. 99, t. 75.

*Brachythecium salebrosum* γ. *palustre* SCHIMP. Syn. 2 ed. 641 (1876). DIX. JAMES. Stud. Handb. 401. HUSN. Musc. Gall. 324.

*Hyphnum plumosum* Var. *Mildei* KINDB. Laubm. Schwed. and Norw. 36 (1883).

*Brachythecium salebrosum* Var. *Mildeanum* HOBK. Synops. 2 ed. 198.

HAB.—Wet places in clay fields and sand by the sea shore.

Sands at Southport (Marrat 1854)!! Hayle sands (Curnow 1862)!! Fourdoun, Kincardine and St. Pallides, Aberdeen (Sim 1870)!! Auchinblae, Kincardine (Hunt 1870). Tents Muir, Fife (Howie 1834).

I have tried in vain to distinguish this specifically from *H. plumosum*, although Lindberg and others keep it distinct.

### 39. HYPNUM ALBICANS Neck.

Dioicous; in lax whitish-green tufts, stems ascending, irregularly branched. Stem-leaves crowded, imbricated, ovato-lanceolate, acuminate, entire, plicate, nerved above half-way. Seta smooth, capsule cernuous, oval, lid conical. (T. CIV, C.)

SYN.—*Hyphnum terrestre erectum humilius albicans ramulis teretibus* DILL. in RAY Synops. 3 ed. 83 (1724).

*Hyphnum sericeum gracile albicans, capsulis subrotundis* DILL. Hist. musc. 328, t. 42, f. 63 (1741), et Herbar.

*Hyphnum albicans* NECK. Meth. musc. 180 (1771). WITHER. Bot. arrang. Br. veg. ii, 688 (1776). HOFFM. Deutsch. Fl. ii, 68 (1795). HEDW. Musc. frond. iv, 13, t. 5 (1797), Sp. musc. 251 (1801). SWARTZ Musc. succ. 64 (1799). ROTH Fl. Germ. iii, P. I, 302 (1800). BRID. Musc. rec. II, P. II, 163 (1801), Sp. musc. II, 188 (1812), Mant. 174 (1819), Bry. univ. ii, 492 (1827). SMITH Fl. Brit. 1309 (1804), Eng. Bot. t. 1300. TURN. Musc. Hib. 171 (1804). SCHULTZ Fl. Starg. 333 (1806). WEB. MOHR Bot. Tasch. 330 (1807). ROEHL. Deutsch. Fl. iii, 112 (1813). SCHWAEGL. Suppl. I, P. II, 214 (1816). HOOK. TAYL. Musc. Br. 101 (1818). GRAY Nat. arrang. Br. pl. i, 758 (1821). HOOK. Fl. Scot. P. 2, 144 (1821), Brit. Fl. ii, 84 (1833). FUNCK Moostasch. 57, t. 39 (1821). HUEBEN. Musc. germ. 635 (1833). RABENH. D. kr. fl. II, S. 3, 294 (1848). C. MUELL. Synops. ii, 360 (1851). WILS. Bry. Br. 337 (1855). BERK. Handb. 78, t. 5 (1863). HOBK. Synops. 149 (1873).

*Neckera albicans* WILLD. Prod. Fl. Berol. n. 940 (1787).

*Hyphnum flavescens* ROTH Fl. Germ. iii, P. I, 303 (1800).

*Brachythecium albicans* BR. SCH. Bry. Eur. fasc. 52—54, p. 19, t. 19 (1853). SCHIMP. Synops. 534 (1860), 2 ed. 644. DE NOT. Epilogo 116 (1869). MILDE Bry. Siles. 338 (1869). HOBK. Synops. 2 ed. 198 (1884). LESQ. JAMES Moss. N. Amer. 337 (1884). HUSN. Musc. Gall. 324, t. 93 (1892). DIX. JAMES Stud. Handb. 400 (1896). LIMPR. iii RABENH. D. kr. fl. Laubm. iii, 124 (1896).

Dioicous; in lax whitish-green tufts, rather glossy; stem slender, ascending, with few irregular branches. Stem-leaves crowded, erecto-patent, appressed when dry, ovato-lanceolate, tapering into long acute points, plicate, nerved above half-way, flat and entire at margin; cells oval at base, quadrate and rectangular at the slightly decurrent angles; branch-leaves lanceolate, biplicate. Perich. bracts long and lanceolate, ending in a long recurved subula; seta red, smooth, capsule cernuous, ovate, gibbous, curved, dark brown, lid conical, apiculate; teeth yellow. Male infl. gemmiform, the bracts ovate, acuminate, nerveless.

HAB.—Damp sandy ground, not uncommon. Fr. 11—12.

In a sterile state this is difficult to distinguish from *H. plumosum*, but the leaves are quite entire with longer slender points, and the basal angular cells smaller and more numerous.

#### 40. *HYPNUM GLAREOSUM* Bruch.

Dioicous; in pale spreading soft glossy tufts; stem subpinnate, with erect acute branches. Stem-leaves erecto-patent, ovato-lanceolate with a long slender acumen, many-plicate, entire nerved half-way; cells at basal angles quadrate. Seta smooth, capsule cernuous, ovate-oblong, arcuate, lid conical, apiculate. (T. CVI, C.)

SYN.—*Hypnum plumosum* HEDW. Stirpes iv, 37, t. 15 (1797) p.p.

*Hypnum plumosum* β. *Minnidunense* BRID. Sp. musc. II, 173 (1812).

*Hypnum albicans* γ. *Minnidunense* BRID. Bryol. univ. ii, 494 (1827).

*Hypnum salebrosum* (non HOFFM.) HOOK. TAYL. Musc. Brit. 2 ed. 166 Supp. t. 5 (1827).  
BERK. Handb. 78 (1863). HOBK. Synops. 148 (1873). BOULAY Musc. Fr. 131 (1884).

*Hypnum glareosum* BRUCH in sched. C. MUELL. Synops. ii, 361 (1851). WILS. Bry. Brit. 338, t. 35 (1855).

*Brachythecium glareosum* BR. SCH. Bry. Eur. fasc. 52—54, p. 19, t. 18 (1853). SCHIMP. Synops. 533 (1860), 2 ed. 644. DE NOT. Epilogo 114 (1869). MILDE Bry. Siles. 337 (1869). HOBK. Synops. 2 ed. 198 (1884). HUSN. Musc. Gall. 324, t. 93 (1892). DIX. JAMES. Stud. Handb. 400 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 119 (1896).

Dioicous; in soft spreading pale green glossy tufts; stem irregularly pinnate; branches erect, simple, acute. Stem-leaves imbricated, erecto-patent, decurrent, ovato-lanceolate, with a long slender acumen and many irregular plaits, nerve ending above middle, margin entire or with a few teeth toward apex; cells oval at base, quadrate at angles; branch-leaves narrower. Perich. bracts sheathing at base, squarrose, inner serrate at point and suddenly elongated into a fine subula. Seta red, smooth;



capsule cernuous, ovate-oblong, gibbous, dark brown, lid conical, apiculate; teeth yellow.

HAB.—Stony places among grass, mostly in limestone districts, not common.  
Fr. 10, rare.

Helk's wood, Ingleton c. fr. (Nowell)!! Stockton forest, York c. fr. (Spruce 1843)!  
Scawton Rowle, York c. fr. (Baker 1857)! Thirsk and Shaw's gill, Yoredale (Baker 1861).  
Cotteral wood (Hunt 1863)!! Stroneuch rocks, Glen Lyon (Hunt 1872)! Near Roche's  
hotel, Glengarriff (Binstead 1900)!!

Sect. 7. PLEUROPUS (Griff.) Mitt. Stems creeping or erect, with acute straight branches. Leaves crowded, glossy, lanceolate, narrowed into long points, with strong longitudinal plaits and nerved nearly to point. Capsule cylindraceous, cernuous or erect, symmetric or curved.

A very natural group of 24 closely allied species, and to show the weakness of genera founded on a single character, *Camptothecium lutescens* occasionally bears fruit as straight as that of *Homalothecium sericeum* SCHIMPER.

#### CLAVIS TO THE SPECIES.

Stems densely coated with radicles, erect; seta smooth.	<i>trichoides</i> .
—— not tomentose, creeping; seta rough.	
Capsule cernuous, curved.	<i>lutescens</i> .
—— erect, symmetric.	<i>sericeum</i> .

#### 41. HYPNUM TRICHOIDES Neck.

Dioicous; stems erect, irregularly pinnate, densely radiculose, the branches short, acute, divergent. Leaves shining, erecto-patent, lanceolate-acuminate, entire, strongly plicate, nerved nearly to apex. Capsule cernuous, oblong, arcuate, lid conical. (T. CVI, D.)

SYN.—*Hypnum palustre erectum trichoides, ramulis crebris, luteo et rufo-virentibus glabris* DILL.  
Cat. Giss. 220 (1718); Hist. musc. 303, t. 39, f. 37 (1741) et Herbar.

*Hypnum trichoides* NECK. Fl. Gallo-belg. ii, 483 (1768), Meth. musc. 162 (1771). POLL.  
Pl. Palat. n. 1047 (1777). LINDB. in Acta Soc. scient. fenn. X, 274 (1872).

*Hypnum nitens* SCHREB. Spic. Fl. Lips. 92 (1771). WEBER Spic. Fl. Goett. 87 (1778).  
ROTH Fl. Germ. I, 472 (1788). DICKS. Pl. crypt. II, 12 (1790). HOFFM. Deutsch. Fl.  
ii, 59 (1795). WITHER. Bot. arrang. 3 ed. iii, 852 (1796). SWARTZ Musc. succ. 62  
(1799). HEDW. Sp. musc. 255 (1801). BRID. Musc. rec. II, P. II, 93 (1801), Sp. musc.  
II, 119 (1812), Mant. 159 (1819), Bry. univ. ii, 560 (1827). SMITH Fl. Brit. 1316 (1804),  
Eng. Bot. t. 1646. SCHULTZ Fl. Starg. 319 (1806). WEB. MOHR Bot. Tasch. 314  
(1807). WAHLENB. Fl. Lapp. 381 (1812), Fl. Carp. 360 (1814). ROEHL. Deutsch. Fl.  
iii, 105 (1813). SCHWAEGL. Suppl. I, P. II, 228 (1816). HOOK. TAYL. Musc. Br. 100  
(1818). GRAY Nat. Arr. i, 757 (1821). FUNCK Moostasch. 59, t. 40 (1821). HOOK.  
Fl. scot. P. II, 144 (1821), Br. Fl. ii, 83. HUEBEN. Musc. Germ. 652 (1833). DE NOT.  
Syllab. 30 (1838). RABENH. D. kr. fl. II, S. 3, 297 (1848). C. MUELL. Synops. ii, 381  
(1851). WILS. Bry. Brit. 337 (1855). SCHIMP. Bry. Eur. fasc. 57—61, p. 53, t. 39  
(1854). BERK. Handb. br. m. 76 (1863). HOBK. Synops. 147 (1873). BOULAY Musc.  
Fr. 139 (1884).

*Camptothecium nitens* SCHIMP. Synops. 530 (1860), 2 ed. 637. MILDE Bry. Siles. 329 (1869). DE NOT. Epilogo 102 (1869). HOOK. Synops. 2 ed. 197 (1884). HUSN. Musc. gall. 320, t. 92 (1892). DIX. JAMES. Stud. Handb. 397 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 58 (1896).

Dioicous; growing in bogs in yellowish-green silky tufts. Stems irregularly pinnate, densely radiculose, the branches bifarious acute. Leaves crowded, erecto-patent, lanceolate-acuminate, deeply plicate, nerve ending below apex, margin entire, recurved below point; cells narrow, about 12 times as long as broad, brown and longish oval at base. Perichæatial bracts appressed, inner long and subulate at apex, plicate, with a thin nerve, seta purple smooth; capsule cernuous, cylindraceous, arcuate, reddish brown, lid conical, pointed; peristome yellow.

HAB.—In moorland bogs, not common. Fr. 4—5, rare.

Pentland hills (*Maughan*). Kinross (*Arnott*). Argyshire (*Carmichael*). Acle, Norfolk (*Turner*). Copgrove, Yorks. (*Dalton*). Knutsford moor, Cheshire c. fr. (*Wilson*)!! Terrington Carr, Yorks. c. fr. (*Spruce*)!! now destroyed along with its companion *Paludella*.

A fine moss, with beautiful silky gloss, and the stems coated densely with fine radicles.

#### 42. *HYPNUM LUTESCENS* Huds.

Autoicous; stem suberect, irregularly branched, branches erect, pointed. Leaves imbricated, elongate lanceolate, acuminate, 4-plicate, entire, nerve ceasing below apex. Seta rough, capsule oblong, cernuous, arched; lid conic rostellate. (T. CVII, A.)

SYN.—*Hypnum sericeum, surculis longioribus et rectioribus, capsulis incurvis* DILL. Hist. musc. 325, t. 42, f. 60 (1741), et Herbar.

*Hypnum lutescens* HUDS. Fl. Angl. 421 (1762). SCHREB. Spic. Fl. Lips. 98 (1771). WITHER. Bot. arr. ii, 683 (1776). RELHAN Fl. Cant. Suppl. 20 (1786). ROTH Fl. Germ. 467 (1788). SIBTH. Fl. Oxon. 298 (1794). HOFFM. Deutsch. Fl. ii, 75 (1795). HEDW. Musc. fr. iv, 40, t. 16 (1797), Sp. musc. 274. SWARTZ Musc. succ. 75 (1799). BRID. Musc. rec. II, P. II, 164 (1801), Sp. musc. II, 175 (1812), Mant. 172 (1819), Bry. univ. ii, 465 (1827). SMITH Fl. Brit. 1311 (1804), Eng. Bot. t. 1301. TURN. Musc. hib. 175 (1804). SCHULTZ Fl. Starg. 333 (1806). WEB. MOHR Bot. Tasch. 314 (1807). ROEHL. Deutsch. fl. iii, 109 (1813). SCHWAEGL. Supp. I, P. II, 237 (1816). HOOK. TAY. Musc. Brit. 100 (1818). HOOK. Fl. Scot. P. II, 143 (1821), Br. Fl. ii, 83 (1833). FUNCK Moostasch. 60, t. 42 (1821). GRAY Nat. Arr. i, 757 (1821). HUEBEN. Musc. Germ. 640 (1833). DE NOT. Syllab. 28 (1838). RABENH. D. kr. fl. II, S. 3, 296 (1848). C. MUELL. Synops. ii, 370 (1851). WILS. Bry. Brit. 338 (1855). BERK. Handb. br. m. 75, t. 5, f. 2 (1865). LESQ. JAMES Moss. N. Amer. 331 (1884). BOULAY Musc. Fr. 137 (1884).

*Hypnum sericeum*  $\beta$ . *prælongum* WEISS Crypt. Goet. 255 (1770).

*Hypnum sericeum*  $\beta$ . *ramosum* LEERS Fl. Herborn. (1775).

*Hypnum myosuroides*  $\delta$ . *prælongum* WEB. Spic. fl. Goett. n. 163 (1778)

*Neckera sericea* Var.  $\beta$ . LEYSS. Fl. Hal. n. 1075 (1783).

*Neckera lutescens* WILLD. Prod. Fl. Berol. n. 939 (1787).

*Climacium lutescens* VOIT Musc. Herbip. 79 (1812).

*Isoethecium lutescens* SPRUCE Musc. Pyr. n. 88 (1847).

*Camptothecium lutescens* BR. SCH. Bry. Eur. fasc. 52—54, p. 6, t. 1 (1853). SCHIMP. Synops. 528 (1860), 2 ed. 635. MILDE Bry. siles. 329 (1869). HOBK. Synops. 2 ed. 197 (1884). HUSN. Musc. gall. 319, t. 91 (1892). DIX. JAMES. Stud. Handb. 396 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 54, f. 361 (1896).

*Brachythecium lutescens* DE NOT. Epilogo 115 (1869).

Dioicous and pseudautoicous; in lax spreading yellow-green glossy tufts. Stem depressed, irregularly pinnate, branches erect or patent, straight, pointed, lowest leaves distant, ovate at base, suddenly narrowed into a recurved subula, entire, nerveless. Leaves imbricated, elongate lanceolate, acuminate, 4-plicate, margin narrowly recurved in lower half and faintly serrate at point, nerved for  $\frac{3}{4}$ ; cells linear, about 12 times long as broad, shorter and laxer in basal angles. Perichæatial bracts spreading at points, innermost erose above, suddenly subulate, with a weak nerve, seta purple, rough, capsule cernuous, cylindraceous, gibbous, pale brown, lid conic, obliquely rostellate; teeth orange, lineal-subulate, cilia two.

HAB.—On limestone rocks, walls and sand dunes, common. Fr. 4.

Very like the next species in the form and structure of leaf, but of different habit; the plant is taller with longer and straighter branches, and it has not the brilliant shining gloss of *H. sericeum*.

#### 43. HYPNUM SERICEUM L.

Dioicous; in bright green glossy tufts, stem creeping, with crowded erect branches; leaves imbricated, erecto-patent, lanceolate-acuminate, plicate, nerved nearly to apex. Seta rough, capsule erect, cylindraceous, lid conic, rostellate. (T. CVII, B.)

SYN.—*Muscus terrestris luteo-viridis, sericeus repens* RAY Synops. 2 ed. 38 (1696).

*Hypnum repens trichodes terrestre, luteo-virens vulgare majus, capitulis erectis* DILL. Cat. Giss. 215 (1718) et in RAY Synops. 3 ed. 84 (1724).

*Hypnum vulgare sericeum recurvum, capsulis erectis cuspidatis* DILL. Hist. musc. 323, t. 42, f. 59 (1741), et Herbar.

*Hypnum sericeum* L. Sp. plant. 1129 (1753). HUDS. Fl. Angl. 428 (1762). NECK. meth. musc. 173 (1771). WITHER. Bot. arrang. ii, 689 (1776). LIGHTF. Fl. scot. ii, 762 (1777). WEBER Spic. Fl. Goet. 96 (1778). RELH. Fl. cant. 415 (1785). CURTIS Fl. Londin. t. 126. HOFFM. Deutsch. fl. ii, 74 (1795). SMITH Fl. Brit. 1282 (1804), Eng. Bot. t. 1445. TURN. Musc. Hib. 138 (1804). HOOK. TAYL. Musc. Brit. 100 (1818). HOOK. Fl. Scot. P. 2, 143 (1821). GRAY Nat. Arr. Br. pl. i, 757 (1821). C. MUELL. Synops. ii, 356 (1851).

*Hypnum sericeum a. curvatum* WEISS Cr. Goett. 254 (1770).

*Neckera sericea* HEDW. Fund. musc. II, 93 (1782). ROTH Fl. Germ. i, 463 (1788). SIBTH. Fl. Oxon. 305 (1794).

*Leskia sericea* HEDW. Descr. iv, 43, t. 17 (1794). SWARTZ Musc. Suec. 69 (1799). BRID. Musc. rec. II, P. II, 40 (1801). Sp. musc. II, 60 (1812). Mant. 144 (1819). Bry. univ. ii, 295 (1827). SCHULTZ Fl. Starg. 312 (1806). ROEHL. Deutsch. Fl. iii, 86 (1813). WAHLENB. Fl. Carp. 356 (1814). SCHWAEGL. Suppl. I, P. II, 178 (1816). FUNCK Moostasch. 55, t. 36 (1821). HUEBEN. Musc. Germ. 580 (1833). DE NOT. Syllab. 63 (1838). RABENH. D. kr. fl. II, S. 3, 252 (1848). WILS. Bry. Brit. 333 (1855). HOBK. Synops. 144 (1873).

*Isothecium sericeum* SPRUCE Musc. pyren. n. 76 (1847). BOULAY Musc. Fr. 140 (1884).

*Homalothecium sericeum* BR. SCH. Bry. Eur. fasc. 46—47, p. 3, t. 1 (1851). SCHIMP. Synops. 525 (1860), 2 ed. 633. BERK. Handb. 142 (1863). MILLE Bry. siles. 293 (1869). DE NOT. Epilogo 203 (1869). HOBK. Synops. 2 ed. 196 (1884). HUSN. Musc. gall. 318, t. 91 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 46 (1896).

*Pleuropus sericeus* DIX. JAMES. Stud. Handb. 395 (1896).

Dioicous; in short glossy yellowish-green tufts; stem creeping, irregularly pinnate with short crowded erect bifarious branches, incurved when dry: stolons with decurrent leaves. Stem-leaves crowded, erectopatent, not decurrent, from a narrow ovate base, lanceolate-acuminate, with 2—4 long plaits, margin flat or a little recurved, minutely serrated, nerve thin, vanishing below apex; cells narrow lineal, flexuose, oval and quadrate at basal angles. Perich. bracts very long, scarcely plicate, attenuated into long points: seta reddish, very rough, capsule erect, long, ovato-cylindric, narrow at mouth, ferruginous; calyptra with short erect hairs at base, lid conical, rostellate; teeth of per. yellow.

HAB.—On boles of trees, walls and stones, common. Fr. 12—2.

## 6. LESQUEREUXIA Br. Sch.

Bry. Eur. fasc. 46—49 (1851).

Primary stem creeping, filiform, the branches forming secondary stems with short ramuli, and numerous paraphyllia. Leaves erectopatent, appressed when dry, ovato-lanceolate, revolute at margin, with a strong nerve; cells oval or narrowly fusiform, rectangular at base, quadrate at angles, smooth or papillose. Calyptra cucullate. Capsule oval and curved or regular and erect; lid conic or rostellate, teeth of peristome lanceolate-subulate, processes of endostome equalling them in length, cilia abortive. Dark green or yellowish brown mosses, growing on rocks or bark.—Der. after Leo Lesquereux a Swiss botanist.

A small genus with which *Pseudoleskea* is united, and comprising about a dozen species varying in size, but closely allied by their slender stems and creeping habit. An excellent monograph of the North American species by Dr. Best will be found in Bulletin of the Torrey Botanical Club for May, 1900.

## CLAVIS TO THE SPECIES.

Leaves spreading on all sides.

Leaves erecto-patent, acuminate, cells smooth.

—— horizontally patent, short-pointed, cells papillose.

—— secund, oblique at points.

Plants trailing, branches straight, leaf-cells oval.

—— slender, closely adherent, branches arcuate, leaf-cells narrow,  
linear.

*plicata.*

*atrovirens.*

*filamentosa.*

*saxicola.*

1. *LESQUEREUXIA PLICATA* (Schleich.) Lindb.

Dioicous; in spreading yellow-green tufts, irregularly pinnate. Leaves crowded, ovato-lanceolate, acuminate, deeply plaited, margin reflexed, entire, nerved nearly to apex; cells smooth; paraphyllia numerous. Capsule ovate-oblong, cernuous. (T. CVII, C.)

SYN.—*Hypnum plicatum* SCHLEICHER Cent. IV, n. 27 et Catal. 1815. WEB. MOHR Bot. Tasch. 364 (1807). BRID. Sp. musc. II, 220 (1812), Mant. 180 (1819). SCHWAEGL. Suppl. I, P. II, 301 (1816). HUEBEN. Musc. germ. 682 (1833). DE NOT. Syllab. 51 (1838). RABENH. D. kr. fl. II, S. 3, 295 (1848). C. MUELL. Synops. ii, 363 (1851). WILS. Bry. Brit. 339 (1855). HOBK. Synops. 147 (1873). BOULAY Musc. Fr. 136 (1884).

*Hypnum Stereodon plicatus* BRID. Bry. univ. ii, 636 (1827).

*Brachythecium plicatum* BR. SCH. Bry. Eur. fasc. 52—54, p. 21, t. 21 (1853). MILDE Bry. Siles. 338 (1869). DE NOT. Epilogo 113 (1869). DIX. JAMES. Stud. Handb. 399 (1896).

*Ptychodium plicatum* SCHIMP. Synops. 527 (1860), 2 ed. 638. BERK. Handb. 133 (1863). HOBK. Synops. 2 ed. 197 (1884). HUSN. Musc. gall. 320, t. 92 (1893). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 802 (1895).

*Lesquereuxia plicata* LINDB. Musc. scand. 36 (1879).

*Ptychodium erectum* CULM. in Rev. bryol. 1884, p. 89.

Dioicous; in trailing dark green tufts, rather glossy, dark brown at base, stems with thick distant curved branches, with short ramuli and numerous multiform paraphyllia. Leaves ovate, much acuminate, erecto-patent when moist, imbricated when dry, yellowish-green, subsecund, nerved nearly to apex; cells smooth, yellow and incrassate at base, long and hexagonal above, quadrate at angles. Perichætal bracts erect, sheathing, pale, nerved above half-way. Seta purple, smooth, capsule cernuous, oblong, dull brown, lid short conical; teeth of peristome orange, lineal-subulate. Male infl. ovate with pointed nerveless bracts.

HAB.—Crevices of alpine rocks. Summit of Ben Lawers, sterile. (Lyon 1841).

This is the only British locality for this moss which is most at home on limestone, in the Alps and Jura mountains. It is to be feared the rapacity of collectors will soon exterminate it here, as the rock on which it grows is well known. It is easily known by the many longitudinal plaits on the leaves.



2. *LESQUEREUXIA FILAMENTOSA* (Dicks.) Lindb.

Dioicous; in dull green depressed mats. Branches irregular, suberect and incurved; leaves imbricated, secund, ovato-lanceolate, oblique at points, margin flat, recurved, nerve vanishing in the apex. Capsule subcernuous, subcylindric, curved, lid conical. (T. CVII, D.)

SYN.—*Hyphnum filamentosum* DICKS. Fasc. Crypt. II, 11 (1790), excl. syn. Dillen. SM. Fl. Brit. 1308 (1804). BRID. Sp. musc. II, 156 (1812), Mant. 167 (1819). BERTOL. Amœn. 438 (1819). C. MUELL. Synops. ii, 478 (1851).

*Leskea incurvata* HEDW. Sp. musc. 216, t. 53 (1801). WEB. MOHR Bot. Tasch. 248 (1807). BRID. Sp. musc. II, 80, Mant. 147, Bry. univ. ii, 320. WAHLENB. Fl. Lapp. 368 (1812), Fl. Carpat. 356 (1814). SCHWÆG. Suppl. I, P. II, 177 (1816). HUEBEN. Musc. germ. 588 (1833). DE NOT. Syllab. 64 (1838).

*Hyphnum atrovirens* (non DICKS.) SM. Fl. Brit. 1307, Eng. Bot. t. 2422. TURN. Musc. Hib. 169 (1804). HOOK. TAYL. Musc. Brit. 110 (1818). HOOK. Fl. Scot. P. II, 147 (1821), Br. Fl. ii, 93 (1833). GRAY Nat. arr. Br. pl. i, 764 (1821). WILS. Bry. Brit. 359 (1855).

*Hyphnum incurvatum* P. BEAUV. Prodr. 65 (1805).

*Leskea atrovirens* HARTM. Skand. Fl. 5 ed. 337 (1849).

*Pseudoleskea atrovirens* BR. SCH. Bry. Eur. fasc. 49—51, p. 2, t. 1 (1852). SCHIMP. Synops. 491 (1860), 2 ed. 603. BERK. Handb. 138 (1863). DE NOT. Epilogo 242 (1869). MILDE Bry. Siles. 269 (1869). HOBK. Synops. 2 ed. 191 (1884). HUSN. Musc. Gall. 305, t. 87 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 809 (1895). DICKS. JAMES. Stud. Handb. 380 (1896).

*Lesquereuxia filamentosa* LINDB. Musc. Scand. 36 (1879).

*Leskea filamentosa* KINDB. Laubm. Schwed. & Norw. 12 (1883).

Dioicous; in rigid wide spreading brownish green mats, ferruginous at base, irregularly branched, the branches short and incurved; paraphyllia very small. Leaves more or less secund, ovato-lanceolate, oblique-pointed, concave, brownish, margin flat with two striæ between it and the continuous nerve; cells uniform, oval—4 to 6 sided, often projecting like papillæ at both sides of a cell-angle, at middle of base shortly rectangular; branch-leaves smaller, margin toothed above. Perichæatial bracts sheathing, broadly lanceolate, acuminate, acute; seta red smooth, capsule horizontal, oval, gibbous, reddish-brown, incurved, lid conic with a narrow annulus; teeth of peristome united at base, pale brown, endostome yellow with lanceolate-subulate processes.

HAB.—Rocks and stones. Fr. 3—4.

Ben Lawers, near Loch-na-Chat!! Ben Cruachpen. Loch Brandy, Clova (*Fergusson* 1868)!!

This species and the next, were united by Hooker under the name *atrovirens*, the descriptions in Dickson's work being too brief for certain identification, and in the early part of the century, minute description was

not considered necessary, yet several authors as C. Mueller and Lindberg were doubtful as to the identity of the next species, and retained the name *filamentosa*. Dr. Best of New Jersey first drew attention to the subject, with the result of proving that they are two distinct species and that Dickson's *atrovirens* is the same as the modern *patens*.

### 3. *LESQUEREUXIA ATROVIRENS* (Dicks.) Best.

Dioicous; in dark green tufts, irregularly pinnate, the branches obtuse. Leaves divergent on all sides, oval and decurrent at base, tapering into acute points, biplicate, recurved at margin and serrulate above, papillose. Capsule oval, long. (T. CVII, E.)

SYN.—*Hypnum atrovirens* DICKS. (excl. syn. Dillen.), Pl. crypt. Fasc. II, 10 (1790) et Herb. (Mus. Brit.)

*Leskea* (?) *patens* LINDB. in Soc. pro Fauna et Fl. fenn. Oct. 1880.

*Lesquereuxia patens* LINDB. in Medd. af Soc. pro Faun. Fl. fenn. 14 heft, p. 75—77 (1887).  
HAGEN in Rev. bryol. 1891, p. 7.

*Pseudoleskea ticinensis* BOTTINI in Proc. verb. Soc. Toscana Sci. nat. 18 genn. 1891.

*Pseudoleskea atrovirens* Var. *patens* HAGEN in sched. 1894.

*Pseudoleskea heterocladioides* KINDB. Rev. bryol. 1895, p. 83.

*Pseudoleskea patens* LIMPR. in RABENH. D. kr. Fl. Laubm. ii, 806, fig. 349 (1895).

*Pseudoleskea atrovirens* BEST Bull. Torrey Bot. Club. xxvii, 224 (1900).

Dioicous; in dull green depressed tufts. Stem trailing, irregularly pinnate, with decurved branches, obtuse at points; paraphyllia numerous small, lanceolate. Leaves rather lax, spreading horizontally on all sides when moist, decurrent, broadly oval at base, tapering into short acute points, more symmetric, biplicate, the margin recurved, serrulate above, nerve vanishing below point, branch-leaves smaller, nerved to middle; cells chlorophyllose, roundish, equal, quadrato-rectangular at base, with a row at margin placed transverse, upper oval, all with a central acute papilla on each surface. Inner perichaetial bracts lanceolate, acute, nerved; seta purple, capsule cernuous, longish oval, gibbous, reddish-brown, lid conic, pointed, peristome yellow. Male infl. oval, bracts ovate acute, nerveless.

HAB.—Alpine rocks, very rare, Fr. 4.

Scotland on trees (*Dickson*). Ben Lawers (*Greville*. *Monington* 1899)!! Canlochan, Braemar c. fr. (*W. Smith*)! in Herb. Hagen.

It is unfortunate that Dickson's specimens are all stuck down on loose pieces of paper, and are not localized, but Mr. Gepp kindly shewed me the specimen referred to by Dr. Best and there is no doubt of its correctness; if

he could also find *H. filamentosum* DICKS. it would clear up the whole matter so far as the two species are concerned. Dr. Hagen kindly sent for my inspection the specimen collected by Mr. Smith, and also a fine tuft in fruit, from Trondjhem.

#### 4. *LESQUEREUXIA SAXICOLA* Molendo.

Dioicous; in prostrate yellowish-green glossy patches. Stem filiform, pinnate, branches arcuate-ascending. Stem-leaves secund, oval at base, lanceolate-subulate, plicate, margin recurved, entire; cells narrow-lineal, capsule longish oval, erect, rufous. (T. CVII, F.)

SYN.—*Lescuræa striata* Var. *β. saxicola* BR. SCH. Bry. Eur. fasc. 46–47, p. 3, t. 1, fig. 12 et *β.* (1851). SCHIMP. Synops. 511 (1860), 2 ed. 621. MILDE in Bot. Zeit. 1861 Beil. 18. HUSN. Musc. gall. 312 (1892). DIX. JAMES. Stud. Handb. 312 (1896).

*Anomodon striatus* Var. *β. saxicola* HARTM. Skand. Fl. 8 ed. 351 (1861).

*Lescuræa saxicola* MOLEND. in LORENTZ Moosstud. 144, 147 et 149 (1864). MILDE Bry. sil. 288 (1869). LINDB. Musc. Scand. 36 (1879). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 792, fig. 347 (1895).

*Leskea atrovirens*? LINDB. in Bot. Notis. 1865, p. 74 in nota.

*Pseudoleskea subfalcata* SCHIMP. in herb. LORENTZ.

*Lescuræa insignis* DE NOT. Epilogo 216 (1869).

*Isoetecium striatum β. saxicola* BOULAY Musc. Fr. 143 (1884).

Dioicous; prostrate in flat yellowish-green glossy patches. Stem filiform, closely adherent to rock, pinnate, branches arcuate-ascending, commonly falcate at apex; paraphyllia small, subulate. Stem-leaves secund, oval at base, lanceolate-subulate, concave plicate, margin recurved, entire or slightly serrate at apex; branch-leaves smaller, secund, lanceolate, obliquely pointed, with a single plait near the margin, and sometimes in old leaves a second pair nearer the nerve, serrulate at point; nerve ending near the apex. Cells narrow and lineal, 5–8 times as long as broad, at basal angles upward 5 or 6 rows of quadrate cells. Perichæatial bracts sheathing, lanceolate-subulate, with a slender nerve; seta purple, capsule longish-oval, erect rufous, lid conical, orange; peristome yellow, the teeth lineal-subulate, endostome a yellow basal membrane with filiform processes and no cilia.

HAB.—On broken pieces of rock, very rare.

Near the summit of Ben Lawers (West 1880)!

The allied species *L. mutabilis* (BRID.) LINDB. = *L. striata* (SCHWÆG.) SCHIMP. has straight branches with leaves spreading on all sides, broadly lanceolate, gradually acuminate and symmetric (figured at L. m.), and is most frequent in S. and Central Europe.

7. *ISOTHECIUM* Bridel.

Bryol. univ. ii, 355 (1827).

Primary stem creeping, stoloniform, bearing clusters of radicles, the secondary divisions erect and subdendroid by fascicles of pointed, curved branches. Leaves crowded, erecto-patent, imbricate when dry, ovate or ovato-lanceolate, suddenly acuminate, not plicate, serrated or entire, nerved; cells linear, at excavate angles quadrate or hexagonal, incrassate and opaque. Seta smooth, capsule erect or inclined, oblong regular or slightly incurved; calyptra cucullate, peristome double, teeth united at base, yellow, endostome a basal membrane  $\frac{1}{2}$  height of teeth, processes subulate, fenestrate in the keel. Inhabiting bark of trees and stones.—Der.  $\sigma\sigma\sigma$  eqaul,  $\Theta\eta\kappa\eta$  a capsule.

## CLAVIS TO THE SPECIES.

Leaves ovate acuminate, serrulate; capsule inclined.  
 ——— elliptic or obovate, subacute; capsule erect.

*myosuroides*.  
*viviparum*.

1. *ISOTHECIUM MYOSUROIDES* (L.) Brid.

Dioicous; in dense spreading, pale or yellowish green tufts. Stem slender, branches fasciculate, often curved to one side; basal leaves nerveless with long points, stem-leaves from a decurrent cordate-ovate base, lanceolate acuminate, serrate; capsule erect or cernuous, longish oval. (T. CVIII, A.)

SYN.—*Hypnum polyanthum, triangularibus angustis foliis* DILL. in RAY Synops. 3 ed. 83 (1724).

*Hypnum myosuroides tenuius capsulis nutantibus* DILL. Hist. musc. 317, t. 41, f. 51 (1741) et Herbar.

*Hypnum myosuroides* L. Sp. pl. 1130 (1753). HUDS. Fl. Angl. 429 (1762). WEISS Cr. Goett. 259 (1770). WITHER. Bot. arrang. ii, 690 (1776). LIGHTF. Fl. Scot. ii, 765 (1777). RELH. Fl. Cant. 417 (1785). BRID. Musc. rec. II, P. II, 168 (1801), Sp. musc. II, 148 (1812), Mant. 165 (1819). SMITH Fl. Brit. 1285 (1804), Eng. Bot. t. 1567. TURN. Musc. Hib. 140 (1804). WEB. MOHR Bot. Tasch. 307 (1807). WAHLENB. Fl. Carpat. 362 (1814). SCHWAEGL. Suppl. I, P. II, 267 (1816). HOOK. TAYL. Musc. Brit. 102 (1818). HOOK. Fl. Scot. P. II, 144 (1821), Br. Fl. ii, 85 (1833). GRAY Nat. arr. i, 759 (1821). DE NOT. Syllab. 19 (1838). RABENH. D. kr. Fl. II, S. 3, 219 (1848). C. MUELL. Synops. ii, 499 (1851). BERK. Handb. 89 (1863). BOULAY Musc. Fr. 117 (1884).

*Hypnum myosurum* SCHRAD. Samml. I, 17 (1796). ROTH Fl. Germ. iii, 302 (1800).

*Isothecium myosuroides* BRID. Ery. univ. ii, 369 (1827). HUEBEN. Musc. germ. 604 (1833). BR. SCH. Bry. Eur. fasc. 46—47, p. 7, t. 2 (1851). WILS. Bry. Brit. 323 (1855). MILDE Bry. siles. 296 (1869). HUSN. Musc. gall. 334, t. 96 (1893). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 42 (1896).

*Leskea myosuroides* HARTM. Skand. fl. 5 ed. 336 (1849).

*Eurhynchium myosuroides* SCHIMP. Synops. 549 (1860), 2 ed. 662. HOBK. Synops. 152 (1873). DIX. JAMES. Stud. Handb. 422 (1896).

*Rhynchostegium myosuroides* DE NOT. Epilogo 79 (1869).

Dioicous; in spreading dense soft yellowish-green tufts; main stem slender, stoloniform, the secondary dendroid, branched at top, at base with ascending stolons. Branches often secund, pointed at end; stolon leaves distant, recurved, nerveless, with long points; stem-leaves crowded, erecto-patent, decurrent and cordate-ovate at base, lanceolate acuminate with a long point  $\frac{1}{3}$  length of leaf, sharply serrate at point, nerve vanishing at middle. Cells incrassate, lineal, at angles small quadrate, yellowish. Branch-leaves longish lanc. sharply serrate above, nerved to middle. Perichæatial squaroso-recurved, inner acuminate, sharply serrated above, with a short thin nerve, seta red, smooth, capsule slightly cernuous, longish oval, reddish-brown, regular or a little curved, lid conic, pointed; peristome yellow, teeth lanceolate-subulate, endostome pale, the processes cleft at the keel, cilia 2—3. Male infl. gemmiform.

HAB.—On trunks of trees and shady rocks, not uncommon. Fr. 11—12. Abundant at Killarney and in S. Wales.

Var. *β. rivulare* Holt in litt.

Plants rigid dark or yellowish green, with long straight subjulaceous branches, stem-leaves short, broad at base with short points, indistinctly toothed, nerve short, simple or forked; branch-leaves short, broad at points, sometimes serrate all round.

SYN.—Var. *β. rivulare* HOLT. LIMPR. Laubm. iii, 45.

*Isothecium Holtii* KINDB. in Rev. bryol. 1895, p. 83, European and N. Amer. Bryinæ 37.

*H. alopecurum β. protensum* TURN. Musc. Hib. 164.

HAB.—On rocks and stones in streams. Tyn-y-groes, S. Wales (Holt 1885)!! Bracklin falls, Callander and at Roy bridge, Inverness (Dixon 1898)!! By the Wye, Erwood, Brecon, and O'Sullivan's Cascade, Killarney (Binstead 1897)!! Lustleigh, Devon and Beddgelert (Dixon).

Var. *γ. tenuinerve* Kindb.

Dark green, rigid, with numerous short branches; stem-leaves wide and cordate at base, deltoid with a long subulato-setaceous point, nearly entire, nerve faint, vanishing about middle, sometimes forked, sometimes absent; branch-leaves ovato-lanceolate, acuminate, sharply serrated. Lid of capsule conic, acute, not rostellate.

SYN.—*Isothecium myosuroides* Var. *brevinerve* KINDB. Note on Canad. bryology (1893).

*Isothecium tenuinerve* KINDB. Check list of Eur. and N. Amer. Mosses (1894). Europ. and N. Amer. Bryinæ 37 (1896).

HAB.—Ben Voirlich (MacKinlay 1863). Slieve League, Donegal (Dixon). Ben Laoigh, Perthsh. (Dixon). Ptarmigan mountain, Inversanda, Ardgour, Argyllsh. (Harting 1900)!!

Var. *δ. minus* Bagnall.



Plants very small and slender, stems short or elongated; leaves narrow acuminate, the cells thin and elongated, the quadrate basal only one or two rows, margins nearly entire.

HAB.—Offchurch, Warwick (*Bagnall* 1893)!! Harlech, N. Wales (*D. A. Jones* 1899)!! Near Kirkdale Cave (*Ingham*, 1899)!!

Var. *ε. debile* *Braithw.*

Plants prostrate, pale yellowish green, branches straight,  $\frac{1}{2}$ —1 in. long slender, simple or with a few short branchlets. Stem-leaves linear at base, obovate above, with a short obsoletely serrate point; branch-leaves erectopatient, oblong with a lanceolate-acuminate oblique point, quite entire, the cells all less incrassate; nerves about  $\frac{1}{2}$  length of leaves.

HAB.—On the earth, bank of a ravine near Chickward, Kington, Herefordshire (*Binstead* 1897)!!

This is a Protean plant, and several other varieties may be established, notably a fine robust form, with leaves tapering gradually into long setaceous points like those of Var.  $\gamma$ , found by Mr. Dixon on Ben Clibrick, Sutherlandshire. It will be seen, these setaceous pointed leaves closely resemble those of the stolons; on this account I do not agree with my friend Kindberg, who regards Var.  $\beta$ ,  $\gamma$ , and  $\epsilon$ . as distinct species.

## 2. *ISOTHECIUM VIVIPARUM* (*Neck.*) *Lindb.*

Dioicous; main stem creeping, stoloniform, secondary erect with dendroid branches at top. Leaves ovate-oblong or elliptic, concave, serrulate at apex, nerved half-way. Capsule ovate, regular, erect, lid conic, shortly rostrate. (T. CVIII, B.)

SYN.—*Hypnum repens triangularibus angustis foliis, ramulis subrotundis* DILL. in RAY Synops. 3 ed. 83 (1724).

*Hypnum myosuroides crassius, capsulis erectis* DILL. Hist. musc. 316, t. 41, f. 50 (1741).

*Hypnum myosuroides* Var.  $\beta$ . L. Sp. plant. 1130 (1753).

*Hypnum viviparum* NECK. Delic. gallo-belg. ii, 475 (1768).

*Hypnum vagum* NECK. in Act. Acad. Theod.-palat. ii, 453 (1770).

*Hypnum myurum* POLLICH Hist. Pl. Palat. iii, 170 (1777). BRID. Musc. rec. II, P. II, 166 (1801), Sp. musc. II, 146 (1812), Mant. 164 (1819). SCHULTZ Fl. Starg. 333 (1806). ROEHL. Deut. Fl. iii. 106 (1813). DE NOT. Syllab. 19 (1838). C. MUELL. Synops. ii, 498 (1851).

*Leskea myosuroides* HEDW. Fund. musc. II, 93 (1782).

*Hypnum myosuroides*  $\gamma$ . *crassius* WEB. Spic. fl. Goett. 94 (1778).

*Leskea vivipara* TIMM Prodr. fl. Megap. n. 808 (1788).

*Hypnum myosuron* GMEL. Syst. Nat. II, 1346 (1791). WITHER. Bot. arrang. 3 ed. iii, 865 (1796).

*Leskea prolifera* LUMNITZ. Fl. Poson. n. 1069 (1791).

*Hypnum myosuroides* HEDW. (non L.) Musc. frond. iv, 20, t. 8 (1793), Sp. musc. 266 (1801).

*Hypnum curvatum* SWARTZ Musc. suec. 64 (1799). SMITH Fl. Brit. 1284 (1804), Eng. Bot. t. 1566. TURN. Musc. Hib. 139 (1804). WEB. MOHR Bot. Tasch. 307 (1807). SCHWAB. Suppl. I, P. II, 267 (1816). HOOK. TAYL. Musc. Brit. 102 (1818). GRAY Nat. arr. Br. pl. i, 758 (1821). HOOK. Fl. Scot. P. II, 144 (1821). RABEN. D. kr. fl. II, S. 3, 291 (1848).

*Leskea curvata* VOIT Musc. Herbip. 72 (1812).

*Isoetecium nyurum* BRID. Bry. univ. ii, 367 (1827). HUEBEN. Musc. germ. 602 (1833). BR. SCH. Bry. Eur. fasc. 46—47, p. 5. t. 1 (1851). WILS. Bry. Brit. 323 (1855). SCHIMP. Synops. 521 (1860), 2 ed. 629. BERK. Handb. 139 (1863). MILDE Bry. siles. 295 (1869). DE NOT. Epilogo 209 (1869). BOULAY Musc. Fr. 143 (1884). HOBK. Synops. 2 ed. 195 (1884). DIX. JAMES. Stud. Handb. 394 (1896). LIMPR. Laubm. iii, 39 (1896).

*Leskea myura* BOULAY Musc. de l'Est 326 (1872).

*Isoetecium viviparum* LINDB. Musc. scand. 36 (1879).

Dioicous; in spreading pale green glossy tufts. Main stem stoloniform, radiculose, with smaller long-pointed leaves, secondary stems erect, subdendroid or with fascicled branches above unequal in length, subjulateous. Basal leaves small appressed, long-pointed, nerveless; branch-leaves erecto-patent, imbricated when dry, longish-ovate, cymbiform-concave, slightly decurrent, margin entire, incurved above, serrulate at point, nerve reaching half-way, sometimes forked; cells linear 7—12 times long as broad, rhomboid at apex, at angles a cluster of roundish 4—5 angled cells; middle branch-leaves obovate, pointed, those of ramuli lanceolate, serrate. Perich. bracts lanceolate pointed nerveless, seta straight, purple; capsule erect, longish ovate, tapering at neck, brown, lid conical with a short oblique beak; peristome pale yellow, papillose; endostome whitish, cilia imperfect.

HAB.—Trees and rocks in shade, not uncommon. Fr. 10—11.

A small slender form occurs, with pale simple branches, found by Mr. Bagnall at Bescote in Warwickshire.

## 8. PTEROGONIUM Swartz.

Disp. musc. fr. Suec. 26 (1799).

Primary stem stoloniform, creeping, secondary robust, ascending, branched like a tree, the branches and ramuli arcuato-incurved. Leaves crowded, imbricated, obovate, scariose; nerve forked, reaching middle, cells at base oval, at middle linear, at apex fusiform, all smooth. Calyptra cucullate with scattered hairs, capsule on a long seta, symmetric, teeth of peristome 16, densely articulate, processes of endostome half as long; inflorescence axillary, gemmiform.—Der. *πτερον* a wing and *γωνία* an angle.

**PTEROGONIUM ORNITHOPODIOIDES (Huds.) Lindb.**

Dioicous; secondary stems ascending with fasciculate arcuate branches. Leaves crowded, imbricated, concave, ovate, serrated above, faintly two-nerved at base. Capsule oblong, lid conic, apiculate. (T. CVIII, C.)

SYN.—*Hyphnum gracile ornithopodioides* DILL. Hist. musc. 320, t. 41, f. 55 (1741).

*Hyphnum ornithopodioides* HUDS. Fl. angl. 430 (1762).

*Hyphnum gracile* L. Mantissa ii, 310 (1771) et Herb. ROTH Fl. germ. i, 471 (1788).

*Pterigynandrum gracile* HEDW. Musc. fr. iv, 16, t. 6 (1793), Sp. musc. 80 (1801). BRID. Musc. rec. II, P. I, 62 (1798), Sp. musc. II, 129 (1806), Mant. 126 (1819), Bry. univ. ii, 174 (1827). ROEHL. Moosg. Deut. 127 (1800), Deutsch. Fl. iii, 53 (1813). P. BEAUV. Prodr. 86 (1805).

*Maschalanthus gracilis* SPRENG. in Schrad. Journ. Bot. ii, 467 (1799).

*Pterogonium gracile* SWARTZ Musc. suec. 26 (1799). SMITH Fl. Brit. 1271 (1804), Eng. Bot. t. 1c85. SCHWAEG. Suppl. I. P. I, 105 (1811). WAHLEN. Fl. carp. 338 (1814). HOOK. TAYL. Musc. Brit. 41, t. 14 (1818). HOOK. Fl. scot. P. II, 129 (1821), Br. fl. ii, 69 (1833). FUNCK Moost. 19, t. 13 (1821). GRAY Nat. arr. Br. pl. i, 728 (1821). BR. SCH. Bry. Eur. fasc. 46—47, p. 4, t. 2 (1851). WILS. Bry. Brit. 321, t. 14 (1855). SCHIMP. Synops. 500 (1860), 2 ed. 575. BERK. Handb. 152 (1863). MILDE Bry. siles. 272 (1869). DE NOT. Epilogo 211 (1869). HOBK. Synops. 142 (1873). LESQ. JAMES Moss. N. Amer. 290 (1884). DIX. JAMES. Stud. Handb. 367 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 780, fig. 345 (1895).

*Grimmia ornithopodioides* WEB. MOHR Bot. Tasch. 148 (1807).

*Leptohymenium gracile* HUEBEN. Musc. germ. 554 (1833). DE NOT. Syllab. 80 (1838). RABENH. D. kr. fl. II, S. 3, 249 (1848).

*Neckera gracilis* C. MUELL. Synops. ii, 97 (1850).

*Leptohymenium duplicato-serratatum* HAMPE in Linnæa xxx, 460.

*Pterogonium ornithopodioides* LINDB. in Oefver. Vet. Akad. foerhandl. xx, 411 (1863). HUSN. Musc. gall. 294, t. 83 (1892).

*Isotheecium ornithopodioides* BOULAY Musc. Fr. 145 (1884).

Dioicous; in rather rigid, lax yellowish-brown glossy tufts; main stem growing from a creeping rhizome, with descending stolons near the base, secondary shoots ascending, dendroid, with fasciculate incurved branches above. Basal leaves appressed, lanceolate, entire, nerveless; upper erect and imbricated when dry, spreading when moist; decurrent, ovate, acute, concave, margin flat, incurved below, serrate toward apex, nerve short, double or forked; cells flat, rhombic above, elongated at mid-base, transversely rhomboidal towards margin. Perich. bracts lanceolate acute nerveless, seta purple; capsule erect, cylindric small at mouth, castaneous; calyptra cucullate with a few fine hairs at back, lid small conic; teeth of peristome lanceolate, yellowish, endostome a low membrane with short subulate processes and no cilia.

HAB.—On rocks and trunks of trees. Fr. 11—12.

Beddgelert (Hunt 1865) !! Lyndhurst (Syme 1858). Rydal (Dr. Wood 1864) !!

## 9. PTERYGYNANDRUM Hedw.

Descr. iv, 16 (1793).

Stems slender arcuate, with many slender stolons at base and flagelliform branches. Leaves densely crowded, patent, ovate or obovate, papillose at back and with a single short nerve, finely serrate above; cells narrowly rectangular at base, quadrate at angles. Calyptra cucullate, naked, capsule erect cylindric, lid conic, rostellate; teeth of peristome distantly articulate, endostome of very short subulate processes without a basal membrane.—Der. *πτερυξ* a wing, *γυνή* female, *ανηρ* male; the male and female inflorescence being axillary.

## PTERYGYNANDRUM FILIFORME (Timm) Hedw.

Dioicous; stems slender, arched, with fasciculate incurved branches. Leaves subsecund, elliptic, acuminate, concave, papillose at back, serrulate at apex, margin recurved, nerved to middle or with two short ones. Capsule elliptic-oblong, erect, lid conic rostellate. (T. CVIII, D.)

SYN.—*Hyfnum filiforme* TIMM Prodr. fl. Megap. No. 817 (1788). HOFFM. Deutsch. Fl. ii, 72 (1795).

*Hyfnum cylindricum* DICKS. Crypt. Fasc. II, 12 (1790). SM. Fl. Brit. 1280 (1804).

*Pterigynandrum filiforme* HEDW. Descr. iv, 18, t. 7 (1793), Sp. musc. 81 (1801). BRID. Musc. rec. II, P. I, 63 (1798), Sp. musc. I, 129 (1806), Mant. 126 (1819), Bry. univ. ii, 177 (1827). ROEHL. Moosg. Deut. 131 (1800), Deutsch. fl. iii, 54 (1813). VORT Musc. Herb. 34 (1812). BR. SCH. Bry. eur. fasc. 46—47, p. 3, t. 1 (1851). SCHIMP. Synops. 508 (1860), 2 ed. 618. BERK. Handb. br. m. 147 (1863). MILDE Bry. siles. 271 (1869). DE NOT. Epilogo 219 (1869). HOBK. Synops. 2 ed. 194 (1884). BOULAY Musc. Fr. 170 (1884). HUSN. Musc. Gall. 311, t. 89 (1892). LESQ. JAMES MOSS. N. Amer. 289 (1884). DIX. JAMES. Stud. Handb. 377 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 784, fig. 346 (1895).

*Maschalanthus filiformis* SPRENG. in SCHRAD. Journ. Bot. ii, 467 (1799). SCHULTZ Fl. Starg. 356 (1806).

*Encalypta filiformis* ROTH Tent. Fl. germ. iii, 155 (1800).

*Pterogonium caespitosum* SM. Eng. Bot. t. 2526.

*Maschalocarpus filiformis* SPRENG. Einleit. 297 (1806).

*Grimmia filiformis* WEB. MOHR Bot. Tasch. 150 (1807). SCHKUHR Deut. Moose 62, t. 27 (1810).

*Pterogonium filiforme* SCHWAEGL. Suppl. I, P. I, p. 100 (1811), Eng. Bot. t. 2297 p.p. WAHLEN. Fl. Lapp. 319 (1812). HOOK. TAYL. Musc. Br. 41 (1818). HOOK. Fl. scot. P. II, 129 (1821), Br. Fl. ii, 70 (1833). GRAY Nat. Arrang. Br. pl. i, 728 (1821). FUNCK Moost. 19, t. 13, f. 1 (1821). WILS. Bry. Br. 320, t. 14 (1855). HOBK. Synops. 141 (1873).

*Leskea cylindrica* BRID. Sp. musc. II, 60 (1812).

*Leptohymenium filiforme* HUEBEN. Musc. germ. 552 (1833). DE NOT. Syllab. 81 (1838). RABENH. D. kr. fl. II, S. 3, 250 (1848).

*Neckera filiformis* C. MUELL. Synops. ii, 89 (1850).

Dioicous; stems arcuate, ascending, with slender fasciculate incurved branches. Leaves crowded, not glossy, greenish-yellow, subscariose, spreading or subsecund, oval-elliptic, acute, symmetric; appressed when dry, papillose at back, the margins recurved below, serrate above, with two short nerves at base or a single one nearly half way, cells rhombic, at base narrowly rectangular, quadrate at angles. Perich. bracts pale, broadly lanceolate, acute, entire; seta reddish-yellow, capsule erect, cylindric pale brown; calyptra smooth, lid conic, obliquely rostellate; peristome yellow, the teeth linear, without lamellæ, endostome without a basal membrane, processes short, subulate.

HAB.—Trunks and roots of trees and on stones on mountains. Fr. 5—6.

Ben Lawers (*Arnott & Greville*). Craig Chaillead (*Hunt* 1868)! Buttermere (*Baker* 1870)!!

Var. *β. decipiens* (*Web. Mohr*) *Br. Sch.*

More robust, in green, turgid tufts, branches curved inward, obtuse; leaves laxer, second, asymmetric, ovato-spatulate, with short bluntish points.

SYN.—*Neckera decipiens* W. M. Bot. Tasch. 241 et 473 (1807).

*Pterigynandrum heteropterum* BRID. Bry. univ. ii, 176 (1827).

*Leptohyemenium heteropterum* HUEBEN. Musc. germ. 553.

Do. *filiforme β. majus*. DE NOT. Syllab. 81.

*Pterigynandrum filiforme β. heteropterum* Bry. eur. fasc. 46—47, t. 1.

*Leptohyemenium claiochloron* DE LOBARZ. in Haiding. Naturw. abh. I, 61.

Do. *filiforme β. alpestre* RABENH. D. kr. fl. II, S. 3, p. 250.

Do. *β. crassius* HARTM. Skand. Fl. 9 ed. 26.

*Pterogonium decipiens* KINDB. Laubm. Schwed. u. Norw. 13.

HAB.—Wet mountain rocks. Ben Lawers (*Hunt* 1865)!

Var. *γ. filescens* Boulay. Musc. Fr. 170.

Densely matted, creeping, yellowish-brown. Branches hair-like, elongated, nearly simple, with distant minute leaves.

HAB.—On a decayed tree in Glen Dole, Clova. (*Hunt* 1867)!

## 10. HELICODONTIUM *Schwaeg.*

Suppl. III, P. II, 2 (1830).

Plants small, succulent, very soft, growing on roots and trunks of trees. Stem prostrate, irregularly branched. Leaves ovate, entire, somewhat oblique, smooth, with a short nerve or nerveless. Capsule erect, subcylindric, lid conical, calyptra cucullate; peristome of 16



lanceolate teeth, curled inward when dry, endostome a wide basal membrane, with 16 carinate processes as long as teeth, or sometimes imperfect, cilia none.—Der.  $\xi\lambda\zeta$  a twisting,  $\omicron\delta\omicron\nu\varsigma$  a tooth.

We have only to look at the plate of *H. tenuirostre* in Schwaegrichen's Suppl. III, P. II, t. 293, to see that there is not a single character to differentiate *Myrinia* from this older genus; it contains about 14 species, chiefly inhabitants of S. America.

### HELICODONTIUM PULVINATUM (Wahlen.) Lindb.

Autoicous; growing in very soft, dingy green tufts, branches short, erect. Leaves spreading, ovate, oblique and blunt at points, entire, nerve faint,  $\frac{1}{3}$  length; cells smooth, longish oval, quadrate at angles. Perich. bracts sheathing, long, linear acute, nerveless. Capsule erect, cylindraceous, lid conical. (T. CVIII, E.)

SYN.—*Leskea pulvinata* WAHLENB. Fl. Lapp. 369 (1812), Fl. Suec. ii, 713 (1826). BRID. Sp. Musc. II, in add. (1812), Mant. 147 (1819), Bry. univ. ii, 316 (1827). BR. SCH. Bry. eur. fasc. 44—45, p. 3, t. 2 (1850). WILS. Bry. Brit. 331, t. 54 (1855). DE NOT. Epilogo 246 (1869). HOBK. Synops. 144 (1873). LESQ. JAMES MOSS. N. Amer. 303 (1884).

*Leskea subenervis* SCHWAEGL. Suppl. I, P. II, 176, t. 85 (1816). FUNCK Moost. 55, t. 36 (1821). BRID. Bry. univ. ii, 307. HUEBEN. Musc. Germ. 586 (1833). DE NOT. Spicil. 9 (1837), Syllab. 67 (1838).

*Neckera pulvinata* C. MUELL. Synops. ii, 83 (1850).

*Myrinia pulvinata* SCHIMP. Synops. 483 (1860), 2 ed. 589. BERK. Handb. 146 (1863). HOBK. Synops. 2 ed. 188 (1884). BOULAY Musc. Fr. 172 (1884). HUSN. Musc. Gall. 299, t. 83 (1892). DIX. JAMES. Stud. Handb. 368 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 743, fig. 341 (1895).

*Helicodontium pulvinatum* LINDB. Musci Scand. 37 (1879).

Autoicous; in dense very soft, dark green tufts, often dirty brown at base. Stem creeping, irregularly branched, the branches short, curved, erect. Leaves spreading, appressed when dry, ovate or ovato-lanceolate, concave, entire, obliquely and obtusely pointed, nerve thin,  $\frac{1}{3}$  length of leaf; cells lax, incrassate, smooth, chlorophyllose, longish-oval, at base rhombic, and quadrate at basal margin. Perichæatial bracts sheathing, convolute, long, linear-lanceolate, acute, nerveless, seta reddish; capsule erect, cylindraceous, with a short neck, brown, contracted below mouth, lid conic, rather obtuse; peristome of 16 teeth, united at base, lineal-lanceolate, endostome a narrow yellow membrane, processes 16, long as teeth, like those of *Isothecium viviparum*; narrow lineal, keeled, often imperfect, cilia none.

HAB.—Wet ground by streams, roots and stems of trees, not common. Fr. 6—7.

By the Ouse, near York (*Spruce* 1841)!! Holgate beck, York (*Webster*)!! Chorlton, Lanc. (*Dr. Wood*). Reddish (*Sidebotham* 1853). Willersley, Hereford (*Binstead* 1893)!! Tadcaster, Yorks. and Cowthorpe Weir (*Spruce*). In the Tay near Kinfauns, Perth (*Meldrum* 1887)!! Dailly, Ayrshire (*Dr. Wood*)!

The texture of this moss is so soft that it is difficult to obtain a good view of the endostome, and fig. 8 no doubt represents the two halves of a process separated by pressure of the cover-glass.

## II. HABRODON *Schimp.*

Synops. 505 (1860).

Plants very small, creeping on the bark of trees in soft dull-green patches, dioicous. Stem slender irregularly branched, the branches short, erect. Leaves appressed when dry, squarrosely spreading when moist, ovato-lanceolate, acuminate in long acute points, concave, nerveless, margin flat and entire. Cells smooth, chlorophyllose, above roundish-oval, at mid-base longish-rhomboid, passing into several rows of quadrate ones at margin. Perich. bracts ovato-lanceolate, inner elongated, eroso-denticulate at margin, seta purple, capsule erect, longish oval, annulus of 3—4 rows of hyaline cells, lid conical, peristome of 16 lineal-lanceolate teeth, whitish, very soft, irregular at point, endostome none. —Der. *ἄβρος* soft, *ὀδὸς* a tooth.

### HABRODON PERPUSILLUS (*De Not.*) *Lindb.*

The only species. (T. CVIII, F.)

SYN.—*Pterogonium perpusillum* (non C. MUELL.) DE NOT. Spicil. 12, n. 22 (1837), Syllab. 84 (1838).

*Pterogonium* ? *subenervium* SPRUCE in Ann. & Mag. Nat. hist. 2 ser. iii, 150 (1849).

*Habrodon Notarisii* SCHIMP. Synops. 505 (1860), 2 ed. 587. Musci Eur. novi fasc. III—IV, 2, t. 1, excl. fig. 20 (1866). BERTOL. Fl. ital. crypt. 433 (1861). HOBK. Synops. 141 (1873). HUSK. Musc. gall. 298, t. 85 (1892). DIX. JAMES. Stud. Handb. 368 (1896).

*Habrodon perpusillus* LINDB. in Oefv. vet. Ak. Foerh. xx, 401 (1863). BOULAY Musc. Fr. 174 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 736, fig. 339 (1895).

*Habrodon* ? *Nicænsis* DE NOT. Epilogo 224 (1869).

*Clasmatodon perpusillus* LINDB. in Journ. Linn. Soc. xiii, 70 (1871).

HAB.—Trunks of plane trees and also on oak, elm, maple and blackthorn.

Rydal, Westmoreland (*Nowell* 1857)!! Windermere (*Dr. Wood*). Finlarig and Killin (*MacKinlay*)!! Near Ilfracombe (*Hunt* 1864)! Bowness and Underbarrow (*Stabler* 1868)! Ayrshire (*Boyd*)!! Tor hill near Wells, Somerset (*Binstead* 1886)!! Dent Yorks. (*Stabler*). Rossdhu, Luss, Loch Lomond (*D. Wilkie* 1898)!! Near Levens Hall and Sizergh Castle, Westmoreland (*Barnes & Stabler* 1869). Grasmere and Shap (*Binstead*). Mardale and Patterdale (*Slater & Stabler*).

This elegant little moss was confused by C. Mueller with *Clasmatodon parvulus* (HAMPE) SULLIV. and called by him *Neckera ferpusilla* Synops. ii, 666, and Schimper in the Bryol. Eur. also united them under the new name *Anisodon ferpusillus*. The two plants are very much alike, but differ sufficiently in the fruit to represent two genera. The headquarters of our moss are in Italy, where it grows on olive and orange trees and fruits freely, and it is reported to have been found with young fruit at Finlarig, near Killin, by McKinlay. It still exists on the plane tree in front of Killin hotel, where Schimper detected it.

Subf. 3. STEREODONTÆ. Plants small or tall, stems creeping or ascending, vaguely or pinnately branched, sometimes dendroid. Leaves compressed or equal on all sides, with two nerves or nerveless, the cells narrow, smooth, or projecting at apex, the basal angular often short and dense. Capsule inclined or cernuous, lid often with a short beak, processes of endostome rarely perforate, with or without cilia.

A. *THELIEÆ*. Plants slender, Leskeoid in habit, the leaves papillose.

It is unfortunate that on account of the difference in neuration, this group should be separated from the Leskeas, with which they have the most natural affinity. In *Thelia* the leaves have ciliated margins.

## 12. MYURELLA Br. Sch.

Bryol. Eur. fasc. 46—47 (1851).

Plants very small and slender, densely tufted, with fragile julaceous stems, often stoloniferous, and few erect branches. Leaves crowded, imbricated, rounded or ovate, very concave, nearly smooth or papillose at back, nerves two, very short, or none. Calyptra cucullate. Capsule suberect, oval; teeth of peristome lanceolate-subulate, endostome with a high basal membrane, processes lanceolate, cilia short binate.—Der. Named from resembling a mouse's tail.

### CLAVIS TO THE SPECIES.

In loose tufts. Leaves with a recurved point, cells papillose.  
In dense cushions. Leaves obtuse, closely imbricated.

*tenerrima*.  
*julacea*.

## 1. MYURELLA TENERRIMA (Brid.) Lindb.

Dioicous; in laxer light green tufts. Leaves laxly imbricated or divergent, suddenly terminating in a recurved apiculus, ovate, concave, denticulate at margin. Capsule erect, longish, ochreous. (T. CIX, A).

SYN.—*Pterygynandrum? tenerrimum* BRID. Mant. 132 (1819), Bry. univ. ii, 196 (1827).

*Hynum moniliforme* var. *apiculatum* SOMM. Suppl. Fl. Lap. (1826).

*Isothecium apiculatum* HUEB. Musc. germ. 598 (1833).

*Hynum apiculatum* THED. in HARTM. Fl. scand. 5 ed. 326 (1849).

*Hynum julaceum* forma *gracilior* C. MUELL. Synops. ii, 466 (1851).

*Myurella apiculata* SCHIMP. Bry. eur. fasc. 46—47, p. 4, t. 2 (1851), Synops. 485 (1860), 2 ed. 593. BERK. Handb. xxxv (1863). DE NOT. Epilogo 240 (1869). HOBK. Synops. 2 ed. 189 (1884). BOULAY Musc. Fr. 170 (1884). LESQ. JAMES MOSS. N. Amer. 300 (1884). HUSN. Musc. gall. 300, t. 85 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 752 (1895). DIX. JAMES. Stud. Handb. 372 (1896).

*Leskea apiculata* HOBK. Synops. 143 (1873).

Dioicous; in loose fragile glaucous-green tufts, or intermixed with other mosses, very slender, with a few simple branches. Leaves laxly imbricated, erecto-patent when moist, ovate, with a recurved apiculus, deeply concave, margin flat, denticulate with the projecting ends of cells, nerves none; cells slightly papillose at back. Perich. bracts sheathing, serrate in the margin above. Seta red, smooth, capsule erect, ochreous, lid conical, pointed.

HAB.—Crevices of rocks and on peaty soil with other mosses. Very rare.

Ben Lawers and Craig Chailleach, sterile (Gardner) !!

An elegant and very slender little moss, only found in small quantity and interwoven among *Blindia* and other mosses.

## 2. MYURELLA JULACEA (Vill.) Br. Sch.

Dioicous; in small pale tufts. Leaves closely imbricated, rounded-ovate, muticous, nearly smooth. Capsule pale brown, with an orange lid. (T. CIX, B.)

SYN.—*Hynum julaceum* VILLARS Pl. Dauph. iii, 909 (1789) (excl. syn. Dillen). SCHWAEG. Suppl. I, P. II, 216, t. 89 (1816). BRID. Mant. 162 (1819). FUNCK Moost. 58, t. 39 (1821). RABENH. D. kr. fl. II, s. 3, 262 (1848). C. MUELL. Synops. ii, 465 (1851).

*Pterigynandrum fragile* SCHLEICH. Cent. IV, no. 6.

*Leskea julacea* SCHWAEG. in Schult. Reise auf d. Glockner II, 363 (1804). WEB. MOHR Bot. Tasch. 251 (1807).

*Hynum moniliforme* WAHLENB. Fl. Lapp. 376, t. 24 p.p. (1812), Fl. Suec. 702 (1826). HOOK TAYL. Musc. Brit. 96 (1818). GRAY Nat. arrang. i, 755 (1821). HOOK. Br. Fl. ii, 81 (1833).

*Pterogonium rotundifolium* SM. Eng. Bot. t. 2525.

*Isothecium ? julaceum* BRID. Bry. univ. ii, 365 (1827).

*Isothecium moniliforme* HUEBEN. Musc. germ. 597 (1833).

*Myurella julacea* BR. SCH. Bry. Eur. fasc. 46—47, p. 3, t. 1 (1851). SCHIMP. Synops. 484 (1860), 2 ed. 593. BERK. Handb. 144 (1863). MILDE Bry. Siles. 259 (1869). DE NOT. Epilogo 240 (1869). BOULAY Musc. Fr. 169 (1884). LESQ. JAMES MOSS. N. Amer. 300 (1884). HOBK. Synops. 2 ed. 189 (1884). HUSN. Musc. gall. 300, t. 85 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 749 (1895).

*Leskea moniliformis* WILSON Bry. Brit. 328, t. 24 (1855). HOBK. Synops. 143 (1873).

Dioicous; in small dense cushions, fragile, pale glaucous-green; stem erect, irregularly branched, the branches simple julaceous, obtuse. Leaves closely imbricated, roundish ovate, obtuse, concave, finely toothed by projecting cell ends, sometimes with a short apiculus; nerve none or very short. Cells hexagono-rhomboid, nearly smooth. Perich. bracts erect, lanceolate, acute, seta purple. Capsule erect, longish oval, pale brown, lid conical, obtuse, teeth lanceolate-subulate, pale yellow, cilia two, short.

HAB.—On rocks on the higher mountains, not common.

Ben Lawers and Craig Chailleach!! Ingleborough (*Nowell* 1863)!! Teesdale (*Borrer* 1810). Canlochan (*Stirton* 1865)! Sedgwick, Westmoreland (*Stabler* 1869). Ben Tigh, Argyll c. fr. (*Paterson* 1875).

Var. *β. scabrifolia* Lindb. Musc. Scand. 37.

Plants very slender and resembling *M. tenerrima*. Leaves with a small apiculus, toothed at base, rough at back with longer papillæ from the cell-angles.

HAB.—Ben Lawers, creeping among other mosses (*Monington, Murray, and Nicholson* 1899)! Craig Chailleach (*Cocks* 1900)!! *Dixon* in Journ. of Bot. 1900, p. 333.

The variety has extremely slender stems, and is intermediate between this species and the last; it has also a close affinity to *M. Careyana* SULLIV.

### 13. HETEROCLADIUM Br. Sch.

Bry. Eur. fasc. 49—51 (1852).

Slender mosses growing in dull green rigid tufts. Stem creeping, irregularly pinnate. Leaves dimorphous, the cauline erecto-patent or squarrose, ovato-acuminate, nerves none or obsolete, those of branches small, ovate, acute; cells of middle longish, the lateral quadrate, projecting as papillæ. Capsule cernuous, ovate; calyptra cucullate, lid convex-conic; teeth lanceolate-subulate, cilia 2—3 or none.—Der. ἑτερος different, κλαδος a branch.

#### CLAVIS TO THE SPECIES.

Stem leaves squarrose, suddenly long-pointed.  
 ——— divergent, secund, short-pointed.

*squarrosulum*.  
*heteropterum*.

### 1. HETEROCLADIUM SQUARROSULUM (*Voit*) Lindb.

Dioicous; stems procumbent, vaguely pinnate, the leaves ovate acuminate, squarrosely recurved, those of branches roundish ovate, sub-erect, all minutely serrulate. Capsule oblong, cernuous, lid conical. (T. CIX, C.)



SYN.—*Hypnum squarrosulum* VOIT in STURM Deutsch. Fl. 2, fasc. 11 (1810), Musc. Herbig. 100 (1812).

*Hypnum dimorphum* BRID. Sp. musc. II, 149 (1812), Mant. 165 (1819), Bry. univ. ii, 581 (1827). FUNCK Moost. t. 49 (1821). GREV. Scot. Cr. Fl. iii, t. 160 (1826). HOOK. TAYL. Musc. Brit. 2 ed. 181, Suppl. t. 5 (1827). HUEBEN. Musc. germ. 664 (1833). HOOK. Br. Fl. ii, 91 (1833). DE NOT. Syllab. 14 (1838). WILS. Bry. Brit. 368, t. 35 (1855). C. MUELL. Synops. ii, 490 (1851). HOBK. Synops. 152 (1873).

*Hypnum Halleri* Var. *dimorphum* SCHWAEGL. Suppl. I, P. II, 283 (1816).

*Heterocladium dimorphum* BR. SCH. Bry. Eur. fasc. 49—51, p. 3, t. 1 (1852). SCHIMP. Synops. 494 (1860), 2 ed. 606. BERK. Handb. 134 (1863). MILDE Bry. Siles. 269 (1869). DE NOT. Epilogo 237 (1869). HOBK. Synops. 2 ed. 191 (1884). LESQ. JAMES Moss. N. Amer. 321 (1884).

*Heterocladium squarrosulum* LINDB. Musc. Scand. 37 (1879). BOULAY Musc. Fr. 159 (1884). HUSN. Musc. gall. 306, t. 87 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 816 (1895). DIX. JAMES. Stud. Handb. 379 (1896).

Dioicous; in bright or yellowish green spreading tufts. Stem creeping, with long rooting stolons, the leaves cordate decurrent, acuminate, squarrosely recurved from middle, finely serrulate, papillose on both sides, nerves short and indistinct; branch leaves small, ovate, erecto-patent when wet, imbricated when dry, serrated; cells lineal in middle, quadrate at margin. Perich. bracts sheathing broadly lanceolate, recurved, nerveless; seta purple. Capsule cernuous, oblong, lid conical; obtuse.

HAB.—On earth, and rocks in alpine localities. Fr. rare, 11—2.

Near summit of Ben Lawers (*Arnott*)!! Clova (*Dr. Stirton* 1863). Glen Dole (*Fergusson* 1868)!!

## 2. *HETEROCLADIUM HETEROPTERUM* (*Bruch*) *Br. Sch.*

Dioicous; in dense procumbent tufts; branches subfasciculate; leaves obliquely imbricated, subsecund, ovate-acuminate, serrated, with two short nerves. Capsule elliptic-oblong, cernuous, lid shortly rostrate. (T. CIX, D.)

SYN.—*Pterogonium heteropterum* BRUCH in lit. SCHWAEGL. Suppl. III, P. I, t. 210 b (1827).

*Hypnum catenulatum* (non SCHWAEGL.) HOOK. TAYL. Musc. Brit. 96, t. 24 (1818). BRID. Br. univ. ii, 450 p.p. (1827).

*Hypnum heteropterum* SPRUCE Musc. Pyren. No. 56 (1847) et in Ann. & Mag. nat. hist. 1849, p. 272. C. MUELL. Synops. ii, 437 (1851). WILS. Bry. Brit. 369 (1855).

*Heterocladium heteropterum* BR. SCH. Bry. Eur. fasc. 49—51, p. 4, t. 2 (1852). SCHIMP. Synops. 495 (1860), 2 ed. 607. BERK. Handb. 134 (1863). MILDE Bry. Siles. 269 (1869). DE NOT. Epilogo 238 (1869). HOBK. Synops. 2 ed. 192 (1884). BOUL. Musc. Fr. 160 (1884). HUSN. Musc. Gall. 307, t. 87 (1892). DIX. JAMES. Stud. Handb. 378 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 813 (1895).

*Leptohymenium Ahnfeltii* AONGSTR. in HARTM. Skand. fl. 10 ed. (1871).

Dioicous; in dense interwoven dark green patches, the stems prostrate, rigid, fragile irregularly pinnate, the branches long and curved, often flagelliform, paraphyllia few, ovate. Leaves erecto-patent, secund, ovate-acuminate, finely denticulate at margin, nerves very short, sometimes single and reaching middle of leaf; cells incrassate elliptic, the ends projecting as papillæ, longer in middle, and at basal margin rounded-quadrate; branch-leaves smaller, ovate, acute. Perich. bracts erect, lanceolate-acuminate with filiform points; seta short, red, smooth, capsule horizontal, ovate-oblong, olivaceous, lid conic, rostrate, calyptra whitish, teeth of peristome pale, cilia two, filiform.

HAB.—Damp shady rocks, not uncommon. Fr. very rare, 11.

Near Aber, Beddgelert and Dolgelly c. fr. (*Wilson*)!! Near Bolton, Lanc. (*Scholefield*).  
Pont Aberglaslyn c. fr. (*Hunt*)!! O'Sullivan's Cascade c. fr. (*Moore* 1866).

Var. *β. flaccidum* Br. Sch. l. c.

Very small and soft, with capillary stems; leaves minute, longish-lanceolate, distant, spreading on all sides.

SYN.—*Heterocladium heteropterum β. fallax* MILDE Bry. Siles. 270 (1869).

*Het. heteropterum* Var. *cavernarum* MOLENDO Bayer. Laub. 210 (1875).

*Het. heteropterum forma umbrosa* H. MUELL. Westf. Laub. No. 316.

HAB.—Wet hollows in rocks.

Near the Strid, Bolton woods (*Bagnall*)! Seckley wood, Stafford (*Bagnall*).

B. EUSTEREODONTÆ. Plants more robust, Hypnoid in habit, the leaves smooth.

#### 14. HYLOCOMIUM Br. Sch.

Bryol. Eur. fasc. 49—51 (1852).

Robust mosses growing in woods in large lax tumid mats. Stems bipinnate, fasciculate or vaguely branched and often with paraphyllia. Leaves glossy, spreading or squarrose, minutely serrate, with two thin nerves and very narrow linear cells. Capsule cernuous, ovate, pachydermous; lid convex-conic, peristome as in *Hypnum*. Der. ὑλοκομος inhabiting woods.

A fine genus of 17 species closely allied to *Hypnum*, but of distinct habit, and chiefly separated by the faint pair of nerves or none, and more regular mode of branching.

## CLAVIS TO THE SPECIES.

Stems with numerous branched paraphyllia.

Stem bipinnate.

Yellowish, glossy. Leaves ovate acuminate.

*proliferum*.  
*umbratum*.

Dark green. Leaves triangular-cordate, coarsely serrate.

— pinnate.

Stem leaves suddenly contracted into a long recurved point.

*brevirostre*.  
*Pyrenaicum*.

— broadly ovate, acute.

Stems without paraphyllia.

Stem pinnate, red. Leaves broad, obtuse.

*parietinum*.

— irregularly branched. Leaves not transversely undulate.

Leaves squarrose, divergent.

Leaves serrulate, rough at back.

— entire, smooth at back.

— densely crowded, falcato-secund above.

*triquetrum*.  
*squarrosom*.  
*loreum*.  
*rugosum*.

— irregularly branched. Leaves undulated with transverse lines.

Sect. A. EUHYLOCOMIUM. Stems prolonged by arched shoots in stages, bi-tri-pinnate, thickly coated with branched paraphyllia.

1. *HYLOCOMIUM UMBRATUM* (Ehrh.) Br. Sch.

Dioicous; stems ascending, irregularly bipinnate, with branched paraphyllia. Leaves laxly imbricated, cordate-acuminate, plicate, acutely serrated, with two nerves. Capsule obovate, cernuous, lid conical, acute. (T. CX, A.)

SYN.—*Hypnum umbratum* EHRH. Pl. crypt. exs. No. 66 (1788). HOFFM. Deutsch. fl. ii, 60 (1795). HEDW. Sp. musc. 263, t. 67, f. 10—13 (1801). BRID. Musc. rec. II, P. II, 76 (1801), Sp. musc. II, 136 (1812), Mant. 163 (1819), Bry. univ. ii, 433 (1827). ROTH Tent. fl. Germ. iii, p. 1, 278 (1800). WEB. MOHR Bot. Tasch. 338 (1807). VOIT Musc. Herbp. 95 (1812). ROEHL. Deutsch. fl. iii, 102 (1813). SCHWAEGL. Suppl. I, P. II, 234 (1816). FUNCK Moost. 59, t. 41 (1821). HUEBEN. Musc. germ. 657 (1833). DE NOT. Syllab. 17 (1838). RABENH. D. kr. fl. II, S. 3, 280 (1848). C. MUELL. Synops. 457 (1851). WILS. Bry. Brit. 382, t. 57 (1855). BERK. Handb. III (1863). HOBK. Synops. 181 (1873). BOULAY Musc. Fr. 8 (1884).

*Hypnum proliferum*  $\beta$ . *umbratum* WAHLENB. Fl. Lapp. 373 (1812).

*Hylocomium umbratum* BR. SCH. Bry. Eur. fasc. 49—51, p. 6, t. 2 (1852). SCHIMP. Synops. 653 (1860), 2 ed. 797. MILDE Bry. Siles. 377 (1869). DE NOT. Epilogo 95 (1859). HOBK. Synops. 2 ed. 233 (1884). LESQ. JAMES Moss. N. Amer. 407 (1884). HUSN. Musc. Gal. 423, t. 122 (1894). DIX JAMES. Stud. Handb. 491 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 581 (1901).

Dioicous; growing in lax dark green irregular tufts. Stem sub-erect, slender, bipinnate, with branched paraphyllia; branches arched downward, acute, fasciculate. Stem leaves spreading, bright or yellowish-green, from a decurrent base, cordate-acuminate, irregularly plicato-striate, sharply serrate, with two nerves reaching middle; cells orange and longish oval at base; branch-leaves ovate, short-pointed, the margin recurved. Perich. bracts elongate-lanceolate, recurved and serrulate at apex; seta purple, capsule short, horizontal, castaneous, cernuous, obovate, lid conic acute peristome orange, cilia 3—4.

HAB.—On stones and walls in alpine woods, not common. Fr. 4.

Clova mountains (*Wilson* 1828)! Glen Dole (*Drummond*)!! Trossachs (*Mrs. Robertson*). Borrowdale, Westmoreland (*Wright* 1856). S. side of Loch Tay (*Dr. Stirton*)!! Near Lodore and Grasmere (*Binstead*)!! Keswick c. fr. (*Miss Wright* 1856). Mardale (*Stabler* 1887).

## 2. *HYLOCOMIUM BREVIROSTRE* (Ehrh.) Br. Sch.

Dioicous; stems ascending, arched, irregularly bipinnate, with branched paraphyllia. Stem-leaves squarrose, cordate plicato-striate, suddenly contracted into a narrow acumen, branch-leaves ovate, acuminate, all serrulate, two-nerved at base. Capsule ovate-oblong, cernuous, lid conical, rostellate. (T. CIX, E.)

SYN.—*Hypnum brevirostrum* EHRH. Pl. crypt. exs. No. 85 (1788). ROTH. Fl. Germ. iii, P. I, 317 (1800). P. BEAUV. Prodr. 61 (1805). SCHULTZ Fl. Starg. 331 (1806). BRID. Sp. musc. II, 195 (1812), Mant. 175 (1819), Bry. univ. ii, 506 (1827). SCHWAEGL. Suppl. I, P. II, 279 (1816), et III, P. I, t. 225 (1827). HOOK. Fl. Scot. P. 2, 146 (1821). FUNCK. Moost. 64, t. 48 (1821). HOOK. TAYL. Musc. Brit. 2 ed. 182 (1827). GREV. Scot. Crypt. Fl. t. 337 (1828). HUEBEN. Musc. germ. 669 (1833). DE NOT. Syllab. 38 (1838). HARTM. Skand. fl. 4 ed. 429 (1843). RABENH. D. kr. fl. II, S. 3, 278 (1848). C. MUELL. Synops. ii, 459 (1851). WILS. Bry. Brit. 383 (1855), et in Eng. Bot. Suppl. t. 2865. BERK. Handb. 113 (1863). HOBK. Synops. 181 (1873). BOULAY Musc. Fr. 7 (1884).

*Hypnum triquetrum*  $\beta$ . minus WEB. MOHR Bot. Tasch. 354 (1807). HOOK. TAYL. Musc. Brit. 108 (1818).

*Hylocomium brevirostre* BR. SCH. Bry. Eur. fasc. 49—51, p. 10, t. 7 (1852). SCHIMP. Synops. 655 (1860), 2 ed. 801. MILDE Bry. Siles. 378 (1869). DE NOT. Epilogo 96 (1869). HOBK. Synops. 2 ed. 233 (1884). LESQ. JAMES MOSS. N. Amer. 407 (1884). HUSN. Musc. Gall. 424, t. 123 (1894). DIX. JAMES. Stud. Handb. 495 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 584 (1901).

Dioicous; in large, lax, somewhat rigid, glossy dark green tufts. Stems erect, arched above and irregularly bipinnate, the branches subdendroid, unequal; paraphyllia short and much branched. Stem leaves subsquarrose, broadly cordate, auricled at base, plicate, suddenly contracted into a long narrow acumen, margin plane, serrulate all round, nerves two, short; cells narrow, orange and rectangular at base; branch-leaves spreading, broadly lanceolate, serrated. Perich. bracts subvaginant, not plicate, suddenly narrowed into a long, serrated recurved subula. Seta purple, capsule cernuous or horizontal, longish ovate, reddish-brown, shining, lid conical, obliquely rostellate; peristome orange, processes of endostome with oval apertures, cilia 2—3.

HAB.—Stony subalpine woods, not common. Fr. 11—2.

New Forest (*Lyell*). Lydford, Devon. (*Holmes*)!! Tyn-y-Groes, S. Wales (*Holt* 1885)!! About Killarney, plentiful (*Wilson*)!! Manchester (*Hobson*). Charlesworth Coombs and Cheedale, Derby (*Whitehead*). Langdale (*Barnes*), Windermere (*Cloues*). Stock Ghyll, Barrow Field, Kentmere Hall, Staveley, Naddle Forest, &c. (*Stabler*).

A fine moss very like *Hyphnum striatum*, but easily known by the villose stems, and the suddenly contracted acumen to the stem-leaves; the lid varies in the length of the point.

### 3. *HYLOCOMIUM PYRENAICUM* (Spruce) Lindb.

Dioicous; stems pinnate, with abundance of branched paraphyllia, branches arched and distant. Leaves imbricated, broadly ovate with a short acute serrated point, plicato-striate. Perich. bracts acuminate, squarrose, capsule ovate, cernuous, lid conic, rostellate. (T. CX, B.)

SYN.—*Hyphnum Pyrenaicum* SPRUCE Musc. Pyr. No. 4 (1847), et in Ann. Mag. Nat. Hist. iii, 129, t. 1 (1849). C. MUELL. Synops. ii, 456 (1851). BOULAY Musc. Fr. 6 (1884).

*Hyphnum Oakesii* SULLIV. in GRAY Man. Bot. U.S. 673 (1848), et in Mem. Amer. Acad. new ser. iv, 173, t. 5 (1849). Icon. musc. 159, t. 102 (1864). WILS. Bry. Brit. 383, t. 57 (1855). BERK. Handb. 112 (1863). HOBK. Synops. 181 (1873). LESQ. JAMES Moss. N. Amer. 408 (1884).

*Hyphnum fimbriatum* HARTM. Skand. fl. 5 ed. 330 (1849). C. MUELL. Synops. ii, 465 (1851).

*Hylocomium fimbriatum* SCHIMP. Bry. Eur. fasc. 49—51, p. 7, t. 3 (1852).

*Hylocomium Oakesii* SCHIMP. Coroll. 139 (1856), Synops. 654 (1860), 2 ed. 800. MILDE Bry. Siles. 378 (1869). DE NOT. Epilogo 94 (1869). HOBK. Synops. 2 ed. 233 (1884).

*Hylocomium Pyrenaicum* LINDB. Musc. scand. 37 (1879). HUSN. Musc. Gall. 423, t. 123 (1894). DIX. JAMES. Stud. Handb. 495 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 582 (1901).

Dioicous; robust, yellowish-green, growing in depressed lax glossy tufts. Stem arched, irregularly and distantly pinnate, beset with large much-branched paraphyllia; leaves imbricated, suberect broad longish-oval, very concave, with a short broad point, plicato-striate, serrated in upper half, with a single or forked nerve to middle; cells uniform, linear-serpentine, orange at insertion; branch-leaves narrower, more acuminate, less concave. Perich. bracts suddenly narrowed at middle into a squarrosely recurved acumen; seta purple, capsule ovate, cernuous, gibbous, ferruginous, lid conic, rostellate, teeth reddish.

HAB.—Alpine rocks. Very rare and sterile.

Near summit of Ben Lawers (*Lyon* 1850)!! Aberdeenshire (*Fergusson*).

### 4. *HYLOCOMIUM PROLIFERUM* (L.) Lindb.

Dioicous; in lax yellowish shining tufts. Stem reddish, bi-tri-pinnate, with branched paraphyllia; leaves imbricated, longish-ovate, with a long cirrhose acumen, serrated, with two short nerves. Capsule ovate, cernuous, lid shortly rostrate. (T. CX, C.)

SYN.—*Hyphnum repens filicinum, veluti spicatum* DILL. Cat. Giss. 217 (1718), in RAY Synops. 3 ed. 86 (1724).



*Hyponum filicinum*, *Tamarisci foliis majoribus splendentibus* DILL. Hist. musc. 274, t. 35, f. 13 (1741) et Herbar.

*Hyponum ramis planopennatis, continuata serie extensis* L. Fl. Lapp. p. 319, n. 406 (1737).

*Hyponum proliferum* L. Fl. Suec. 2 ed. 1020 (1745), Mantissa ii, 507 (1771). HUDS. Fl. Angl. 422 (1762). WEBER Spic. Goett. 61 (1778). CURTIS Fl. Lond. t. 9 (1777). VILL. Pl. Dauph. iii, 899 (1786). BRID. Musc. rec. II, p. II, 68 (1801). SCHULTZ Fl. Starg. 316 (1806). WAHLENB. Fl. Lapp. 373 (1812), Fl. Suec. 2 ed. ii, 721.

*Hyponum parietinum* L. Syst. Veg. 1590. HUDS. Fl. Angl. 422 (1762). WEISS Cr. Goett. 232 (1770). NECK. Meth. musc. 175 (1771). SCHMIDEL Icon. et Anal. t. 58, f. 3 (1776). WITHER. Bot. arrang. ii, 684 (1776). LIGHTF. Fl. Scot. ii, 751 (1777). HEDW. Fundam. ii, 94, t. 4, f. 13 (1782). RELHAN Fl. Cant. 410 (1785). ROTH Tent. fl. Germ. i, 467 (1788). HOFFM. Deutsch. fl. ii, 60 (1796). SWARTZ Musc. Suec. 73 (1799). HULL Br. fl. P. II, 271 (1799).

*Hyponum splendens* SIBTH. Fl. Oxon. 295 (1794). HOST Syn. pl. Austr. 591 (1797). HEDW. Sp. musc. 262, t. 67, fig. 6—9 (1801). SM. Fl. Brit. 1296 (1804), Eng. Bot. t. 1424. TURN. Musc. Hib. 156 (1804). P. BEAUV. Prodr. 72 (1805). WEB. MOHR Bot. Tasch. 338 (1807). VOIT Musc. herb. 105 (1812), et in STURM Fl. Germ. II, fasc. 13. BRID. Sp. musc. II, 137 (1812), Mant. 163 (1819), Bry. univ. ii, 435 (1827). ROEHL. Deutsch. fl. iii, 101 (1813). SCHWAEG. Suppl. I, p. II, 237 (1816). HOOK. TAYL. Musc. brit. 103 (1818). HOOK. Fl. Scot. 144 (1821). FUNCK Moost. 60, t. 42 (1821). GRAY Nat. arrang. i, 759 (1821). HUEBEN. Musc. germ. 656 (1833). DE NOT. Syllab. 17 (1838). RABENH. D. kr. fl. II, S. 3, 267 (1848). C. MUELL. Synops. ii, 457 (1851). WILS. Bry. Brit. 381 (1855). BERK. Handb. 110, t. 9 (1863). HOBK. Synops. 180 (1873). BOUL. Musc. Fr. 9 (1884).

*Hylocomium splendens* BR. SCH. Bry. Eur. fasc. 49—51, p. 5, t. 1 (1852). SCHIMP. Synops. 652 (1860), 2 ed. 798. MILDE Bry. Siles. 377 (1859). DE NOT. Epilogo 93 (1869). HOBK. Synops. 2 ed. 232 (1884). LESQ. JAMES Moos. N. Amer. 407 (1884). HUSN. Musc. gall. 422, t. 122 (1894). DIX. JAMES. Stud. Handb. 493 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 577, f. 436 (1901).

*Thuidium splendens* BROCKM. Laubm. Mecklenb. 118 (1869).

*Hylocomium proliferum* LINDB. in Acta Soc. sci. fenn. x, 20 (1871).

Dioicous; yellowish or olivaceous green, glossy. Stem 3—6 in. long, erect or ascending, interruptedly bi-tri-pinnate, rising by arcuate stages, the branches slender and acute. Paraphyllia numerous with very slender divisions. Stem-leaves imbricated, broadly ovate, suddenly narrowed into long flexuose points, slightly plicate, concave, roughish towards apex at back with distant spinules, margin recurved below, serrulate above, nerves two,  $\frac{1}{4}$  length of leaf; cells small, orange at base, narrow oval. Branch-leaves oval, pointed. Perich. bracts convolute, broadly lanceolate, with slender recurved points; seta purple, smooth, capsule ovate, cernuous, castaneous, lid conico-rostellate; teeth united at base, yellow, cilia 2—4.

HAB.—Heaths and woods, common. Fr. 4, rare.

Linnaeus strangely confounded this species with *Thuidium tamariscifolium* and also with *H. parietinum* as evidenced by his herbarium, and this led to similar misunderstanding among some of his immediate successors, so that it is very difficult to clear up the synonymy of the three species.

Sect. B. PLEUROZIUM. Stem regularly pinnate, without paraphyllia. Stem-leaves ovate.

5. **HYLOCOMIUM PARIETINUM** (L.) Lindb.

Dioicous; stem erect, simply pinnate, red, without paraphyllia, branches slender, curved. Leaves imbricated, shining, yellowish green, elliptic, obtuse, entire, two-nerved at base; perich. bracts erect, acutely pointed. Capsule ovate-oblong, curved, cernuous; lid conical. (T. CX, D.)

SYN.—*Muscus erectus, foliis angustis caulibus appressis* Doody, RAY Synops. 2 ed. App. 337 (1696).

*Hynum longum erectum, foliis angustis caul. app.* DILL. in RAY Synops. 3 ed. 83, No. 20 (1724).

*Hynum cupressiforme tenuius et compressius* DILL. Hist. musc. 312, t. 40, f. 47 (1741) et Herbar.

*Hynum parietinum* L. Fl. Suec. 2 ed. no. 1200 (1755), Fl. Lapp. no. 406.

*Hynum cuspidatum*  $\beta$ . *inermis* WEISS Crypt. Goett. 253 (1770). WEBER Spic. Fl. Goett. 59 (1778).

*Hynum compressum* SCHREB. Spic. Fl. Lips. 96 (1771). NECK. Meth. musc. 159 (1771), Del. gallo-belg. ii, 477 (1778). WAHLENB. Fl. Lapp. 373 (1812), Fl. Carpat. 357 (1814).

*Hynum Schreberi* WILLD. Prodr. Fl. Berol. 325, No. 955 (1787). ROTH Fl. Germ. i, 469 (1788). SIBTH. Fl. Oxon. 295 (1794). BRID. Musc. rec. II, P. II, 88 (1801), Sp. musc. II, 122 (1812), Mant. 159 (1819), Bry. univ. ii, 420 (1827). SM. Fl. Brit. 1315 (1804), Eng. Bot. t. 1621, Turn. Musc. Hib. 176 (1804). P. BEAUV. Prodr. 65 (1805). WEB. MOHR Bot. Tasch. 340 (1807). ROEHL. Deutsch. fl. iii, 104 (1813). SCHWAEGL. Suppl. I, P. II, 227 (1816). HOOK. TAYL. Musc. Brit. 96 (1818). HOOK. Fl. Scot. P. 2, 143 (1821). GRAY Nat. arr. i, 755 (1821). FUNCK. Moost. 58, t. 40 (1821). HUEBEN. Musc. germ. 650 (1833). DE NOT. Syllab. 21 (1838). HARTM. Skand. fl. 4 ed. 420 (1843). RABENH. D. kr. fl. II, S. 3, 288 (1848). C. MUELL. Synop. ii, 384 (1851). BR. SCH. Bry. Eur. fasc. 57—61, p. 51, t. 37 (1854). WILS. Bry. Brit. 376 (1855). SCHIMP. Synops. 645 (1860), 2 ed. 790. BERK. Handb. 108 (1863). MILDE Bry. Siles. 371 (1869). HOBK. Synops. 179 (1873). BOULAY Musc. Fr. 13 (1884). LESQ. JAMES Moss. N. Amer. 404 (1884). HUSNOT Musc. gall. 418, t. 61 (1894). DIX. JAMES. Stud. Handb. 491 (1896).

*Hynum furum*  $\beta$ . HUDS. Fl. angl. 504 (1762).

*Hynum inermis* SCHRANK Baier. fl. ii, No. 149 (1789).

*Hynum muticum* GEUNIS. Pl. Belg. spic. 46 (1788). SWARTZ Musc. Suec. 60 (1799).

*Stereodon Schreberi* MITT. Journ. Linn. Soc. viii, 42 (1865).

*Pleurozium Schreberi* MITT. Journ. Linn. Soc. xii, 537 (1869).

*Hylocomium Schreberi* DE NOT. Epilogo 92 (1869). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 587 (1901).

*Hylocomium parietinum* LINDB. in Acta Soc. sc. fenn. x, 62 (1878), Musc. Scand. 37 (1879).

Dioicous; in yellowish-green glossy lax tufts. Stem erect, simply pinnate, red, without paraphyllia, 4—6 in. high, the branches divergent, attenuated and curved downward. Stem-leaves imbricated, suberect, broadly ovate, obtuse, entire, margin incurved toward apex and faintly crenulate at point, nerves two, very short; cells linear, at basal angles

orange, quadrate. Perich. bracts erect, two-nerved, broadly lanceolate, acute, not striated, seta purple, capsule cernuous, castaneous, ovate-oblong, curved, lid conical, peristome orange, inner with 2—3 cilia.

HAB.—Woods and shady banks, common. Fr. 10—11, rare.

Linnaeus tells us that the name refers to the use of the moss in Sweden, to stop the crevices in their wooden houses. It appears to have been used for a similar purpose in this country, as it has been found in ancient crannoges in several localities.

Sect. C. RHYTIDIADELPHUS. Stem distinctly pinnate with unequal branches, without paraphyses. Stem-leaves squarrose or recurved, plicate longitudinally.

## 6. *HYLOCOMIUM TRIQUETRUM* (L.) Br. Sch.

Dioicous; stems erect, rigid, subpinnate. Stem-leaves cordate at base, triangular, gradually narrowing to an acute point, squarrose, striated, two-nerved. Capsule roundish-ovate, cernuous, lid conical. (T. CXI, A.)

SYN.—*Muscus terrestris maximus ramosus erectior, latioribus et pallidioribus foliis* RAY Synops. 2 ed. 36 (1696).

*Hynum refens triangularibus majoribus et pallidioribus foliis* DILL. Cat. Giss. 219 (1718), et in RAY Synops. i, 3 ed. 80 (1724).

*Hynum vulgare, triangulum, maximum et pallidum* DILL. Hist. musc. 293, t. 38, f. 28 (1741) et Herbar.

*Hynum triquetrum* L. Sp. plant. 1124 (1753). HUDS. Fl. Angl. 420 (1762). WEISS Crypt. Goett. 222 (1770). NECK. Meth. musc. 185 (1771). WITHER. Bot. arrang. ii, 682 (1776). LIGHTF. Fl. Scot. 746 (1777). WEB. Spic. Fl. Goett. 77 (1778). HEDW. Fundam. II, 94 (1782), Sp. musc. 256 (1801). RELH. Fl. Cant. 409 (1785). ROTH Fl. Germ. i, 465 (1788). SIBTH. Fl. Oxon. 297 (1794). HOFFM. Deutsch. fl. ii, 66 (1795). SWARTZ Musc. Suec. 59 (1799). BRID. Musc. rec. II, P. II, 157 (1801), Sp. musc. II, 197 (1812), Mant. 175 (1810), Bry. univ. ii, 508 (1827). SM. Fl. Brit. 1324 (1804), Eng. Bot. t. 1622. TURN. Musc. Hib. 186 (1804). SCHULTZ Fl. Starg. 331 (1806). WEB. MOHR Bot. Tasch. 354 (1807). WAHLBN. Fl. Lapp. 373 (1812), Fl. Carpat. 359 (1814). SCHWAEGL. Suppl. I, P. II, 280 (1816). HOOK. TAYL. Musc. Brit. 108 (1818). HOOK. Fl. Scot. P. 2, 146 (1821). GRAY Nat. arrang. i, 763 (1821). FUNCK Moost. 64, t. 48 (1821). HUEBEN. Musc. germ. 665 (1833). DE NOT. Syllab. 40 (1838). RABENH. D. kr. fl. II, S. 3, 278 (1848). C. MUELL. Synops. ii, 444 (1851). WILS. Bry. Brit. 385 (1855). BERK. Handb. 114, t. 9 (1863). MILDE Bry. Siles. 344 (1869). HOBK. Synops. 182 (1873). BOULAY Musc. Fr. 2 (1884). LESQ. JAMES Moss. N. Amer. 409 (1884).

*Hylocomium triquetrum* BR. SCH. Bry. Eur. fasc. 49—51, p. 8, t. 5 (1852). SCHIMP. Synops. 657 (1860), 2 ed. 803. DE NOT. Epilogo 97 (1869). HOBK. Synops. 2 ed. 234 (1884). HUSN. Musc. Gall. 424, t. 123 (1894). DIX. JAMES. Stud. Handb. 498 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 592 (1901).

Dioicous; in tall, rigid, glossy, yellowish or bright green tufts. Stem red, erect dichotomous, pinnate; branches unequal, attenuated and decurved, or short and thick. Stem-leaves squarrose, cordate at base, broadly ovate, gradually triangular and acute at apex, scariose and rough

at back in the upper part with minute spinulose papillæ, multiplicate, margin serrulate, nerves two, slender,  $\frac{1}{2}$ — $\frac{3}{4}$  length of leaf, cells narrow and linear, lax, rectangular and yellow at base. Perich. bracts not plicate, appressed, suddenly subulate and squarrosely recurved; seta purple, capsule roundish-ovate, cernuous, castaneous, gibbous, lid conical, peristome orange.

HAB.—Woods and hedges, common. Fr. 12—2.

A fine moss not often found in fruit. Sometimes the leaves are more or less secund, and a form also occurs, especially on sandy places by the sea, in dense dark green tufts, with short stems, and crowded leaves. St. Anne's, Lancashire (*Beesley* 1901).

### 7. *HYLOCOMIUM SQUARROSUM* (L.) Br. Sch.

Dioicous; erect, slender, irregularly pinnate. Stem-leaves crowded, ovato-acuminate, squarrose and recurved, faintly striate, serrulate, two-nerved at base. Capsule roundish-ovate, cernuous, lid conical. (T. CXI, B.)

SYN.—*Hypnum repens triangularibus reflexis foliis minus*. DILL. in RAY Synops. 3 ed. 82 (1724), Hist. musc. 304, t. 39. f. 39 (1741) et Herbar.

*Hypnum squarrosium* L. Sp. pl. 1127 (1753). HUDS. Fl. Angl. 425 (1762). WEISS Crypt. Goett. 242 (1770). NECK. Meth. musc. 171 (1771). WITHER. Bot. arrang. ii, 686 (1776). LIGHTF. Fl. Scot. 755 (1777). WEB. Spic. fl. Goett. 70 (1776). HEDW. Fund. I, 94 (1782), Sp. Musc. 282. RELH. Fl. Cant. 413 (1785). ROTH Fl. Germ. i, 469 (1788). SIBTH. Fl. Oxon. 299 (1794). HOFFM. Deutsch. fl. ii. 65 (1795). SWARTZ Musc. Suec. 59 (1799). BRID. Musc. rec. II, P. II, 146 (1801), Sp. Musc. II, 204 (1812), Mant. 176 (1819), Bry. univ. ii, 511 (1827). SM. Fl. Brit. 1323 (1804), Eng. Bot. t. 1593. TURN. Musc. Hib. 184 (1804). SCHULTZ Fl. Starg. 329 (1806). WEB. MOHR Bot. Tasch. 353 (1807). WAHLEN. Fl. Lapp. 374 (1812), Fl. Carpat. 359 (1814). SCHWAEGL. Suppl. I, P. II. 282 (1816). HOOK. TAYL. Musc. Brit. 108 (1818). HOOK. Fl. Scot. P. 2, 146 (1821). GRAY Nat. Air. i, 763 (1821). FUNCK Moost. 64, t. 48 (1821). HUEBEN. Musc. Germ. 667 (1833). DE NOT. Syllab. 40 (1838). RABENH. D. kr. fl. II. S. 3, 278 (1848). C. MUELL. Synops. ii, 443 (1851). WILS. Bry. Brit. 386 (1855). BERK. Handb. 113, t. 10 (1863). MILDE Bry. Siles. 343 (1869). HOBK. Synops. 181 (1873). BOULAY Musc. Fr. 3 (1884). LESQ. JAMES MOSS. N. Amer. 409 (1884).

*Hylocomium squarrosium* BR. SCH. Bry. Eur. fasc. 49—51, p. 9, t. 6 (1852). SCHIMP. Synops. 656 (1860), 2 ed. 802. HOBK. Synops. 2 ed. 233 (1884). HUSN. Musc. Gall. 425, t. 123 (1894). DIX. JAMES. Stud. Handb. 497 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 594 (1901).

Dioicous; in lax soft tufts, bright or yellowish green. Stems red, slender erect irregularly pinnate, the branches distant and unequal. Stem-leaves squarrose and recurved, crowded, ovate at base, concave, becoming narrow and lanceolate, smooth at back, serrulate at apex, nerves none or two very short ones; cells pointed, linear, rectangular at base, at angles oval. Branch-leaves narrower, less squarrose. Perich. bracts not plicate, outer recurved, inner erect, lanceolate with long

setaceous points; seta purple, capsule horizontal or drooping, castaneous, ovate and gibbous, lid red, acutely conical.

HAB.—Banks and woods, common. Fr. 11—12, scarce.

Var. *β. calvescens* Wils.

Resembling *H. brevirostre*; stems procumbent at base, pinnate, the branches arched, decurved and attenuated at points. Leaves broadly cordate-acuminate, amplexicaul, serrated, with two short nerves; cells at basal angles more numerous, quadrate and rectangular.

SYN.—*Hynum calvescens* WILS. Bry. Brit. 387, in adnot.

*Hynum subpinnatum* LINDB. in HARTM. Skand. fl. 9 ed. 13. MILDE Bry. Siles. 344.

*Hylocomium subpinnatum* LINDB. in Hedwigia 1867, p. 41, et in Notis. ur Saellsk. Fl. et. Faun. fenn. foerh. 1868, p. 271.

*Hylocomium calvescens* LINDB. Musc. scand. 37.

*Hylocomium squarrosum β. patulum* JUR. BROCKM. Laubm. Meckl. 149.

*Hylocomium squarrosum* Var. *subpinnatum* SCHIMP. Synops. 2 ed. 803.

*Pleurozium calvescens* KINDB. in Rev. bryol. 1895, p. 82.

*Hylocomium squarrosum* Var. *β. calvescens* HOBK. Synops. 2 ed. 234. LIMPR. in RABENH. D. kr. fl. Laubm. iii, 596.

HAB.—Wet rocky places in subalpine districts.

Rowes wood (Wilson 1848)!! Whaley bridge (Whitehead 1863). Long Sleddale and near Kendal (Binstead 1885)!! Stock Ghyll (Stabler 1887).

## 8. *HYLOCOMIUM LOREUM* (L.) Br. Sch.

Dioicous; in lax expanded tufts, irregularly pinnate. Stem-leaves subsecund, ovato-lanceolate, gradually extended into a long subulate recurved acumen, plicate below, faintly two-nerved. Capsule ovate, lightly striate when empty. (T. CXI, C.)

SYN.—*Hynum repens, triangularibus reflexis foliis majus* DILL. Cat. Giss. 219 (1718), et in RAY Synops. 3 ed. 82 (1724), Hist. musc. 303 t. 39, f. 38 (1741) et Herbar.

*Muscus erectus major, foliis angustioribus acutis* RAY Synops. 2 ed. 337 (1696).

*Hynum repens surculis magis erectis, foliis reflexis langioribus cinctis, operculo capituli magno* DILL. in RAY Synops. 3 ed. 82 (1724).

*Hynum loreum montanum, capsulis subrotundis* DILL. Hist. musc. 305, t. 39, f. 40 (1741) et Herbar.

*Hynum loreum* L. Sp. plant. 1127 (1753). HUDS. Fl. Angl. 425 (1762). WEISS Cr. Goett. 244 (1770). NECK. Meth. musc. 170 (1771). WITHER. Bot. arr. ii, 687 (1776). RELH. Fl. Cantab. 413 (1785). ROTH Fl. Germ. i, 470 (1788). SIBTH. Fl. Oxon. 297 (1794). HOFFM. Deutsch. fl. ii, 66 (1795). SWARTZ Musc. Suec. 59 (1799). HEDW. Sp. musc. 294 (1801). BRID. Musc. rec. II, P. II, 143 (1801), Sp. musc. II, 206 (1812), Mant. 177 (1819), Bry. univ. ii. 515 (1827). SM. Fl. Brit. 1324 (1804), Eng. Bot. t. 2072. TURN. Musc. Hib. 185 (1804). SCHULTZ Fl. Starg. 329 (1806). WEB. MOHR Bot. Tasch. 253 (1807). WAHLEN. Fl. Lapp. 374 (1812). SCHWAEGL. Suppl. I,



P. II, 293 (1816). HOOK. TAYL. Musc. Brit. 108 (1818). HOOK. Fl. Scot. P. 2, 181 (1821). FUNCK Moost 66, t. 50 (1821). HUEBEN. Musc. Germ. 666 (1833). DE NOT. Syllab. 39 (1838). RABENH. D. kr. fl. II, S. 3, 279 (1848). C. MUELL. Synops. ii, 442 (1851). WILS. Bry. Brit. 386 (1855). BERK. Handb. 115, t. 9 (1863). MILDE Bry. Siles. 345 (1869). HOBK. Synops. 182 (1873). BOULAY Musc. Fr. 5 (1884). LESQ. JAMES MOSS. N. Amer. 410 (1884).

*Hyphnum squarrosum a loreum* WEB. Spic. fl. Goett. 70 (1778).

*Hyphnum loreiforme* GRAY Nat. arr. Br. pl. i, 763 (1821).

*Hylocomium loreum* BR. SCH. Bry. Eur. fasc. 49—51, p. 7, t. 4 (1852). SCHIMP. Synops. 658 (1860), 2 ed. 804. HOBK. Synops. 2 ed. 234 (1884). HUSN. Musc. Gall. 425, t. 124 (1894). DIX. JAMES. Stud. Handb. 496 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 590 (1901).

Dioicous; in lax extended dingy yellowish-green tufts. Stem trailing, ascending, vaguely pinnate; branches unequal, arcuate divergent attenuated. Stem-leaves crowded, squarrose, falcato-secund, from an ovate concave plicate base, gradually elongated into a long lanceolate-subulate recurved acumen, incurved and serrulate at margin; nerves two short or obsolete; cells linear, the basal orange rectangular, not different at the angles. Perich. bracts sheathing, squarrosely recurved, seta purple, capsule horizontal, globose-oval, brown, lid hemispherico-conical. HAB.—On stones and in damp subalpine woods. Fr. 12.

Sect. D. RHYTIDIUM. Irregularly pinnate; paraphyllia few, undivided, at base of branches. Leaves transversely sulcate, rough with teeth at back, nerve single.

### 9. *HYLOCOMIUM RUGOSUM* (L.) De Not.

Dioicous; stem erect, pinnate with recurved branches, leaves crowded, ovato-lanceolate, falcato-secund, wrinkled, serrulate, nerved above middle. Capsule subcylindric, arcuate, lid with a short beak. (T. CXI, D.)

SYN.—*Hyphnum repens crispum lutescens, montanum et majus* DILL. Cat. Giss. 217 (1719).

*Hyphnum lutescens crispum Lycopodii facie* DILL. Hist. Musc. 289, t. 37, f. 24 A, B, D. (1741) et Herbar.

*Hyphnum rugosum* L. Mant. pl. i, 131 p.p. (1767), Syst. Nat. ii, 703. OEDER Enum. pl. fl. dan. 79 (1770). EHRH. Dec. no. 291 (1793). ROTH. Fl. Germ. i, 465 (1788). HOFF. Deutsch. fl. ii, 63 (1795). WITHER. Bot. arrang. 3 ed. iii, 856 (1796). HEDW. Sp. musc. 293 (1801). BRID. musc. rec. II, P. II, 139 (1801), Sp. Musc. II, 128 (1812), Mant. 180 (1819), Bry. Univ. ii, 633 (1827). WAHLEN. Fl. Lapp. 377 (1812). SCHWAEGL. Suppl. I, P. II, 302 (1816). FUNCK Moost. 66, t. 51 (1821). HUEBEN. musc. germ. 681 (1833). RABENH. D. kr. fl. II, S. 3, 269 (1848). C. MUELL. Synops. ii, 423 (1851). WILS. Bry. Brit. 391 (1855). BR. SCH. Bry. eur. fasc. 57—61, p. 41, t. 28 (1854). SCHIMP. Synops. 615 (1860), 2 ed. 745. BERK. Handb. 122 (1863). HARTM. Skand. fl. 9 ed. ii, 16 (1864). MILDE Bry. Siles. 356 (1869). HOBK. Synops. 171 (1873). BOULAY Musc. Fr. 44 (1884). LESQ. JAMES MOSS. N. Amer. 388 (1884). HUSNOT musc. Gall. 398, t. 115 (1894).

*Hyphnum rugulosum* WEB. MOHR. Bot. Tasch. 363 (1807). ROEHL. Deutsch. Fl. iii, 116 (1813). HOOK. TAYL. Musc. brit. 112 (1818). GRAY Nat. arrang. i, 765 (1821).

*Hylacomium rugosum* DE NOT. *Epilogo* 99 (1869). DIX. JAMES. *Stud. Handb.* 498 (1896).  
LIMPR. in RABENH. *D. kr. fl. Laubm.* iii, 597 (1901).

*Rhytidium rugosum* KINDB. *Laubm. Schwed. et Norw.* 15 (1883).

Dioicous; in lax extended yellowish-green or golden-brown tufts, ferruginous at base. Stem rigid, depressed or ascending, irregularly branched or pinnate, the branches in two rows, decurved, turgid, densely leafy, a few small paraphyllia at their bases. Stem-leaves densely crowded; falcato-secund, ovato-lanceolate, acuminate, longitudinally plicate and transversely wrinkled, margin recurved in the lower half and serrated; nerve, one reaching middle, back of leaf above rough with spinulose papillæ; cells narrow, linear-vermiform, at base rectangular, at angles quadrate in a triangular group. Perich. bracts erect, plicate, lanceolate, nerveless, seta purple; capsule cernuous, cylindric gibbous, lid conic, rostellate, peristome yellow.

HAB.—Grassy banks and rocks in subalpine calcareous districts.

Norfolk (*Eagle*). Kenmore and Ben Lawers (*Arnott*). Dovedale (*Braithwaite*)!! Whitbarrow (*Clowes* 1856). Witherslack and Brigsteerwood (*Stabler*). Beetham Fell (*Barnes* 1867). Grasmere (*Binstead* 1893). Near Lough Foyle, Derry (*Lett & Waddell*).

## 15. CAMPYLIUM (*Sull.*) *Mitt.*

Musc. & Hep. U.S. 77 (1856).

Slender, prostrate mosses, vaguely or subpinnately branched; leaves from a broad ovate base, suddenly running out in a long acumen, subsquarrose, finely serrulate, nerves two, very short or none, cells linear, very narrow, quadrate at angles. Capsule inclined, subcylindric curved, lid convex-conic. Der.—*καμπυλος* curved.

### CLAVIS TO THE SPECIES.

Leaves sheathing at base, squarroso-recurved, serrulate.  
—— not sheathing, squarroso-divergent, serrulate below

*Halleri*.  
*hispidulum*.

## 1. CAMPYLIUM HALLERI (*Swartz*) *Lindb.*

Autoicous; stem creeping pinnate and with short erect branches in the centre; leaves crowded, squarroso-recurved, broadly ovate-acuminate, serrulate, obsoletely two-nerved. Capsule oblong, curved, cernuous, lid conical. (T. CXII, A.)

SYN.—*Hypnum caulibus prostratis, foliis lanceolatis reflexis, operculo conico* HALLER *Hist. stirp. helv.* no. 1734 (1768).

*Hyponum Halleri* SWARTZ Meth. musc. 375 (1781). HOFFM. Deutsch. fl. ii, 61 (1795). HEDW. Stirp. cr. iv, 53, t. 21 (1797). Sp. musc. 279 (1801). ROTH Tent. fl. germ. iii, P. I, 294 (1800). BRID. Musc. rec. II, P. II, 122 (1801). Sp. musc. II, 106 (1812). Mant. 176 (1819). Bry. univ. ii, 603 (1827). P. BEAUV. Prodr. 65 (1805). WEB. MOHR. Bot. Tasch. 352 (1807). WAHLENB. Fl. Lapp. 374 (1812). ROEHL. Deutsch. fl. iii, 113 (1813). SCHWAEGL. Suppl. I, P. II, 283, excl. syn. *H. dimorphum* (1816). FUNCK Moostasch. 64, t. 28 (1821). GREV. Scott. cr. Fl. iii, t. 174 (1826). HOOK. TAY. Musc. Brit. 2 ed. 180, Supp. t. 5 (1827). HUEBEN. Musc. Germ. 671 (1833). DE NOT. Syllab. 43 (1838). Epilogo 172 (1869). RABENH. D. kr. fl. II, S. 3, 280 (1848). C. MUELL. Synops. ii, 440 (1851). WILS. Bry. Brit. 368, t. 35 (1855). BR. SCH. Bry. Eur. fasc. 57—61, p. 11, t. 1 (1854). BERK. Handb. 100 (1863). MILDE Bry. Siles. 341 (1869). HOBK. Synops. 165 (1873). HUSNOT Musc. Gall. 364, t. 104 (1894).

*Hyponum Campylium Halleri* SCHIMP. Synops. 599 (1860). DIX. JAMES. Stud. Handb. 456 (1896).

*Hyponum (Campylophyllum) Halleri* SCHIMP. Synops. 2 ed. 721 (1876). BOULAY Musc. Fr. 70 (1884).

*Campylium Halleri* LINDB. Musc. Scand. 38 (1879).

*Hyponum Macouni* KINDB. in Bot. Torrey Club. XVII, 279.

*Hyponum (Chrysohyponum) Halleri* LIMPR. in RABENH. D. kr. fl. Laubm. iii, 346 (1898).

Autoicous; growing in dense flat extended tufts, glossy pale green, yellowish brown when dry, black at base. Stem creeping, with lanceolate paraphyllia, branches dense, short, stiff, obtuse at points. Leaves crowded, squarrosely recurved, broadly ovate at base, suddenly narrowed into a lanceolate serrulate subula; nerves none or obsolete; basal angular cells yellow and quadrate. Perich. bracts sheathing, ovate, suddenly elongated into a recurved serrated subula, nerved to middle; seta purple, capsule cernuous, longish, slightly curved, ferruginous, the lid convex, orange. Teeth united at base yellow, cilia 2—3.

HAB.—Mountain rocks. Fr. 8.

Summit of Ben Lawers (*Greville, Hooker, Arnott*) !! Ben Cruban (*Arnott*). Ben Tigh, Argyll (*Paterson* 1875).

## 2. *CAMPYLIUM HISPIDULUM* (*Brid.*) Mitt.

Autoicous; slender, soft, growing in bright green patches. Stem-leaves rather distant, divergent, from a broad ovate base, narrowed into a long acute acumen, finely serrulate. Capsule inclined, oblong, curved; lid convex-conic, apiculate. (T. CXII, B.)

SYN.—*Hyponum hispidulum* BRID. Sp. Musc. II, 198 (1812). Mant. 175 (1819). C. MUELL. Synops. ii, 440 (1851). SULLIV. Mosses of Un. States 77 (1856). Icon. musc. 193, t. 119 (1864). LESQ. JAMES MOSS. N. Amer. 378 (1884).

*Hyponum Stereodon stellatus*  $\delta$ . *hispidulus* BRID. Bry. univ. ii, 603 (1827).

*Stereodon hispidulus* MITT. Jour. Linn. soc. viii, 43 (1864).

*Campylium hispidulum* MITT. in ditto xii, 631 (1869).

*Hyponum Sommerfeltii*  $\beta$ . *stellatum* SCHIMP. Synops. 2 ed. 723 (1876).

*Campylium hispidulum* LINDB. Musc. Scand. 38 (1879).

*Amblystegium hispidulum* KINDB. Laubm. Schwed. and Norw. 48 (1883).

*Hypnum stellulatum* KINDB. Op. c. 41.

Autoicous; in dense bright green patches, stem procumbent, with tufted radicles, irregularly subpinnate, branches slender, erect or spreading, with subulate paraphyllia at base. Stem-leaves loose, patent or reflexed, from a decurrent deltoid-cordate concave base, suddenly acuminate in a long point, finely serrulate all round, nerves two, very short or none; cells narrow, linear, at basal angles quadrate and rectangular, green. Perich. bracts whitish, oblong, longly acuminate, reflexed at point, sulcate, serrulate; capsule small, oblong, more or less incurved, castaneous, on a pale seta, lid convex-conic with a curved apiculus, cilia of endostome with lateral appendages.

HAB.—Stony ground and base of trees in N. America frequent, and also in Norway, Sweden, Lapland and Finland.

Dr. Best has kindly sent me good American specimens, and I can find no specific difference between them and our British *Sommerfeltii*. The leaves are wider at base and their cells rather shorter and wider.

Var. *β. Sommerfeltii* (*Myrin*) Lindb.

Leaves not so wide below, serrulate only above base, and with a longer more subulate acumen, cells narrower and longer and at angles yellowish.

SYN.—*Hypnum stellatum γ. polymorphum* ROEHL. D. Fl. iii, 103 (1813). BRID. Bry. univ. ii, 602.

*Hypnum affine* SOMMERF. Suppl. Fl. Lapp.

*Hypnum Sommerfeltii* MYRIN in Vet. Akad. Arsb. Holm. 1831, p. 328, et in HARTM. Handb. Sk. fl. 5 ed. 331 (1849). Bry. Eur. fasc. 57—61, p. 12, t. 2 (1854). SCHIMP. Synops. 600. HUSNOT Musc. gall. 364, t. 104. DE NOT. Epilogo 173 (1869). DIXON 456. LIMPR. iii, 348.

*Hypnum stellatum* Var. *tenellum* C. MUELL. Synops. ii, 435.

*Hypnum polymorphum* (non HEDW.) BRUCH MS. WILS. Bry. Brit. 367. BERK. Handb. 100.

*Campyllum hispidulum β. Sommerfeltii* LINDB. Musc. Scand. 38.

*Campyllum Sommerfeltii* BRYHN Explor. 61 (1893).

HAB.—Walls and rocks in limestone districts. Fr. 5—6.

Near Bangor (*Wilson* 1826)! Kirkham Abbey and Crambeck, near Castle Howard (*Spruce*)!! Wall of Cum Hagg wood, Do. (*Slater*)!! Mackershaw wood, Ripon (*Brunton*). Barrow Field and Haversham head, Westmoreland (*Barnes* 1868). Barbon Fell (*Stabler*). Doward hills (*Rev. A. Ley*). Wolstonbury hill, Sussex (*Mitten*).

## 16. CTENIDIUM (*Schimp.*) Mitt.

Journ. Linn. Soc. xii, 21 (1869).

Plants prostrate or erect, with or without radicles; the branches and ramuli pectinato-pinnate or subfasciculate; leaves circinate-secund,

from a decurrent cordate base, lanceolate-subulate, equal or compressed and secund; nerves two, short or none; cells very narrow, elongate, smooth. Capsule horizontal, ovate, calyptra more or less hairy, lid convex-conic, peristome perfect.—Der. *κτελις* a comb, *ειδος* likeness.

## CLAVIS TO THE SPECIES.

Plants soft, radiculose, leaves serrated, papillose.  
 ——— firm, not radiculose; leaves entire, smooth.

*molluscum*.  
*procerrimum*.

I. CTENIDIUM MOLLUSCUM (*Hedw.*) Mitt.

Dioicous; stems procumbent or suberect, pinnate; leaves circinate-secund, cordate-acuminate, serrate, papillose, cells at angles many, quadrate and rectangular, branch-leaves ovato-lanceolate; capsule ovate, cernuous, lid conical, pointed. (T. CXII, C.)

SYN.—*Hypnum filicinum, cristam castrensem representans* DILL. Hist. musc. 284, t. 36, f. 20 (1741) et Herb.

*Hypnum molluscum* HEDW. Descr. iv, 56, t. 22 (1797). SWARTZ Musc. Suec. 55 (1799). Sm. Fl. Brit. 1335 (1804), Eng. Bot. t. 1227. TURN. Musc. Hib. 198 (1804). WEB. MOHR Bot. Tasch. 369 (1807). BRID. Sp. musc. II, 208 (1812), Mant. 177 (1819), Bry. univ. ii, 519 (1827). ROEHL. Deutsch. fl. iii, 114 (1813). SCHWAEG. Suppl. I, P. II, 293 (1816). WAHLENB. Fl. Carpat. 361 (1814). HOOK. TAYL. Musc. Brit. 114 (1818). FUNCK Moost. 65, t. 52 (1821). HOOK. Fl. Scot. P. 2, 148 (1821). GRAY Nat. arrang. i, 766 (1821). HUEBEN. Musc. Germ. 686 (1833). DE NOT. Syllab. 54 (1838), Epilogo 175 (1869). RABENH. D. kr. fl. II, S. 3, 276 (1848). C. MUELL. Synops. ii, 297 (1851). BR. SCH. Bry. Eur. fasc. 57—61, p. 29, t. 18 (1854). WILS. Bry. Brit. 395 (1855). SCHIMP. Synops. 631 (1860), 2 ed. 769. BERK. Handb. 123 (1863). MILDE Bry. Siles. 366 (1869). HOBK. Synops. 175 (1873). BOULAY Musc. Fr. 28 (1884). LESQ. JAMES Moss. N. Amer. 389 (1884). HUSN. Musc. Gall. 409, t. 118 (1894). DIX. JAMES. Stud. Handb. 478 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 447 (1898).

*Hypnum crista-castrensis* (non L.) WEISS Cr. Goett. 283. WEBER, HUDSON, ROTH, &c.

*Hypnum Timmii* BRID. Musc. rec. II, P. II, 123 (1801).

*Ctenidium molluscum* LINDB. Musc. Scand. 38.

Dioicous; growing in spreading densely matted yellowish-green tufts. Stems prostrate or ascending, pinnate with close short branches spreading horizontally; paraphyllia ovato-lanceolate, serrate. Stem-leaves from a decurrent cordate base, divergent, suddenly narrowed into a long lanceolate-subulate, falcato-secund point, faintly plicate, margin plane, sharply serrate, nerves obsolete or none; cells at basal angles quadrate, upper projecting at apex in a papilla; branch-leaves lanceolate, serrate, falcato-secund. Perich. bracts broadly lanceolate, with long slender points, nerveless; seta short, purple, capsule horizontal, roundish-ovate, gibbous, castaneous, calyptra with a few scattered hairs, lid convex-conic, acute; annulus of 3 rows, peristome orange. Male infl. ovate with ovate acute serrated bracts.



HAB.—On the ground in limestone districts, common. Fr. 11—12.

Var. *β. croceum* Tayl. *Hyponum croceum* TAYL. MSS.

Stems tall, erect, densely tufted, golden-yellow, with few irregular branches; leaves large, circinate, striated when dry.

HAB.—On wet rocks, Knockavohila, Kenmare (Taylor)!! Killarney (Binstead 1896)!! Inverness-shire (Greville). Hill Bell and Grisedale (Stabler). Helvellyn (Waterfall 1887). Pigeon rock mountain, Co. Down, Ireland (Lett & Waddell 1885)!!

Var. *γ. condensatum* Schimp. Synops. 632.

Growing in depressed expanded tufts, orange or straw colour, stems short and stout, closely pinnate, the branches hooked at point, leaves falcate, plicate.

HAB.—On humus among rocks. Marple, Cheshire (T. Rogers)!!

Var. *δ. robustum* Boulay.

Nearly erect, 2—4 in. high, in lax yellowish-green tufts, fuscous at base, orange at points. Stems irregularly pinnate with short branches from the upper part. Leaves large, flexuose in the upper half, strongly falcate, cells laxer, margin with few short distant teeth.

HAB.—Mardale, Westmoreland (Binstead 1893)!! Ben Narnain, Argyllshire (Dixon 1898)!!

Var. *ε. fastigiatum* Bosw.

Slender, branches erect, less closely pinnate, somewhat fastigiate; leaves less crowded, small, less strongly falcate.

SYN.—HORK. Synops. 2 ed. 226. DIXON Handb. 479.

HAB.—By the Dove Holes, Dovedale (Holmes)! erroneously referred to *S. Canariensis*.

This fine moss varies very much, and the figure is drawn from the slenderest form, from which there is every stage of gradation to robust.

## 2. CTENIDIUM PROCERRIMUM Molendo.

Dioicous; resembling *C. molluscum* but much more robust, brownish-green, glossy, the branches dense, regularly pectinato-pinnate in arrangement. Stem-leaves crowded, falcato-secund, from a cordate base, lanceolate-subulate, auricled, entire, nerves obsolete or forked, cells at angles quadrate. (T. CXII, D.)

SYN.—*Hyponum procerrimum* MOLEN. in Flora 1866 p. 458. DE NOT. Epilogo 174 (1869). PFEFFER Bryog. Studien 92 (1869). SCHIMP. Synops. 2 ed. 764 (1876). HUSN. Musc. Gall. 403, t. 116 (1894). DIX. JAMES. Stud. Handb. 477 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 451 (1899).

*Hyponum petraeum* BOUL. Musc. de l'Est 264 (1872).

*Hyponum (Ctenidium) procerrimum* MOL. l. c.

Dioicous; in deep expanded tufts, dull yellow-green above, fuscous below, glossy. Stem prostrate, without radicles, 2—4 in. long, with broadly ovate paraphyllia at base of branches, often divided into two or three ascending shoots, pectinately pinnate with close slender branches, accrescent upward to above the middle and then decrescent to apex, spreading horizontally. Stem-leaves densely crowded, falcato-secund, entire, from a cordate base, broadly lanceolate, gradually narrowed into a long subulate point, slightly decurrent at the rounded auricles, nerve of two unequal legs or obsolete; cells very narrow and linear, not papillose, at base orange hexagono-rectangular, at the angles many small and quadrate; branch-leaves narrower hooked and longly acuminate, incurved at margin. Fruit unknown.

HAB.—Rocky hollows on mountains. Summit of Ben Lawers (*Stirton* 1867)!!  
Found in the Tyrol, Switzerland and Pyrenees.

### 17. HYCOMIUM *Schimp.*

Bry. Eur. f. 45—46 (1853).

Growing on stones in streams, in bright green or yellowish tufts. Stem-leaves broadly cordato-triangular, with a long acuminate point, serrulate, nerve very short, forked; cells flexuose-linear, at angles hexagono-rectangular. Capsule on a thick rough seta, turgid, oval, lid convex.—Der. *ὑκομος* living in places soaked with water.

### HYCOMIUM FLAGELLARE (*Dicks.*) *Schimp.*

The only species. (T. CXII, E.)

SYN.—*Hypnum flagellare* (non HEDW.) DICKS. Pl. crypt. Fasc. II, p. 12, excl. syn. (1790). WITHER. Bot. arrang. 3 ed. iii, 856 (1796). SM. Fl. Brit. 1322 (1804). P. BEAUV. Prodr. 64 (1805). HOOK. TAYL. Musc. Brit. 104 (1818). GRAY Nat. arrang. i, 760 (1821). HOOK. Fl. Scot. P. 2, 145 (1821). BRID. Bry. univ. ii, 434 (1827). C. MUELL. Synops. ii, 436 (1851). WILS. Bry. Brit. 384 (1855). BERK. Handb. 115, t. 9 (1863). HOBK. Synops. 156 (1873).

*Hypnum armoricum* BRID. Bry. univ. ii, 525.

*Hypnum pseudo-commutatum* LA PYLAIE MS.

*Hypnum umbratum* (non HEDW.) SM. Eng. Bot. t. 2565. TURN. Musc. Hib. 158 (1804).

*Hyocomium flagellare* BR. SCH. Bry. Eur. fasc. 45—46, p. 2, t. 1 (1853). SCHIMP. Synops. 563 (1860), 2 ed. 660. MILDE Bry. Siles. 314 (1869). HUSN. Musc. Gall. 332, t. 95 (1893). DIX. JAMES. Stud. Handb. 411 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 151, f. 380 (1897).

*Hypnum (Eurhynchium) flagellare* BOUL. Musc. Fr. 118 (1884).

Dioicous; in wide-spreading, bright green or yellowish tufts, vaguely pinnate, not glossy, continued as prostrate rooting stolons. Branches arched, subfasciculate, with few ramuli, and unequal in length; paraphyllia small, lanceolate. Stem-leaves crowded, divergent, from a broad decurrent base, deltoid-cordate, suddenly prolonged into a lanceolate-subulate, recurved point, concave, feebly striate, sharply serrate all round, nerve very short and double or sometimes reaching above middle, cells narrow and linear, at angles hyaline, small, oval and hexagono-rectangular. Branch-leaves divergent, ovato-lanceolate. Perich. bracts pale, erect, lanceolate with a long flexuose subula, seta red, rough with tubercles, capsule cernuous, ovate-oblong, gibbous, peristome yellow, inserted below the mouth, processes fenestrate, cilia two, appendiculate.

HAB.—By waterfalls and on stones in streams. Not common. Fr. 10—11.

Aber and Bangor, N. Wales c. fr. (*Wilson*)!! Beddgelert and Arthog c. fr. (*Hunt* 1865)!! Rivington Pike, Bolton c. fr. Lydford cascade c. fr. (*Holmes* 1867)!! Cromaglow, Killarney c. fr. (*Wilson* 1829)! Rowardennan glen, Loch Lomond (*Kidston*)!! Glen Lochay (*Cocks* 1900)!! with two long nerves. Near Loch Scatavagh, N. Uist, a very slender form (*Braithwaite* 1899)!!

This moss is rare on the continent, and resembles a *Brachythecium*, but is easily distinguished by the different nerves, the fruit is rare.

## 18. PTILIUM (*Sulliv.*) *De Not.*

Musc. & Hep. U.S. 73 (1856).

Tall laxly tufted mosses with simple or dichotomous stems coated with numerous paraphyllia, distichously pinnate, the branches of equal length, horizontally divergent. Stem-leaves from a broad ovate base, gradually lanceolate-subulate, strongly multiplicate, nerves two very short or none, cells very narrow and linear. Capsule cylindric, arcuate.—Der. *πτελον* feathers.

## PTILIUM CRISTA-CASTRENSIS (L.) *De Not.*

The only species. (T. CXII, F.)

SYN.—*Hypnum crista-castrensis* L. Sp. pl. 1125 (1753), Syst. naturæ ii, 703 (1791). SWARTZ Musc. suc. 65 (1799). HEDW. Sp. musc. 287, t. 76, f. 1—4 (1801). WEB. MOHR Bot. Tasch. 368 (1807). WAHLENB. Fl. Lapp. 377 (1812), Fl. Carpat. 361 (1814). BRID. Sp. musc. II, 207 (1812), Mant. 177 (1819), Bry. univ. ii, 517 (1827). HOOK. TAYL. Musc. Brit. 114 (1818). SCHWÆG. Suppl. I, P. II, 293 (1816). HOOK. Fl. Scot. P. 2, 148 (1821). HUEBEN. Musc. Germ. 685 (1833). DE NOT. Syllab. 54 (1838). RABENH. D. kr. fl. II, S. 3, 276 (1848). C. MUELL. Synops. 296 (1851). WILS. Bry. Brit. 395 (1855). BR. Sch. Bry. Eur. fasc. 57—61, p. 30, t. 19 (1854). BERK. Handb. 123, t. 11 (1863). MILDE Bry. Siles. 366 (1869). HOBK. Synops. 156 (1873). HUSN. Musc. Gall. 409, t. 118 (1894). DIX. JAMES. Stud. Handb. 479 (1896).

*Hypnum scalare* ZENK. DIETR. Musc. Thuring. exsic. no. 26 (1823).

*Hypnum filicinum* (non L.) HOFFM. Deutsch. fl. ii, 61 (1796). ROTH, SCHRANK, BEAUVOIS, &c.

*Hypnum* (*Ptilium*) *crista-castrensis* SULLIV. l. c. LIMPR. in RABENH. D. kr. fl. Laub. iii, 444 (1898).

*Hypnum* (*Ctenium*) *crista-castrensis* SCHIMP. Synops. 632 (1860), 2 ed. 770. LESQ. JAMES Moss. N. Amer. 389 (1884). BOULAY MUSC. Fr. 27 (1884).

*Stereodon* (*Drepanium*) *crista-castrensis* MITT. Journ. Linn. Soc. viii, 41 (1864).

*Ptilium cristacastrensis* DE NOT. Epilogo 101 (1869).

Dioicous; in lax rigid yellow-green tufts. Stems 3—5 in. high, suberect, simple or divided, beset with lanceolate paraphyses, pinnate, the branches in two rows, close set and spreading horizontally. Stem-leaves secund, from a broad ovate base, gradually lanceolate-subulate, falcate, multiplicate, faintly serrate in upper half, nerves short and double or none; cells narrow and vermiform, smooth, the basal and angular longer and wider. Branch-leaves secund, circinate, crowded. Perich. bracts erect, pale, broadly lanceolate, acuminate, plicate, nerveless, seta purple; capsule cernuous or horizontal, cylindric, curved, brown; lid conical; teeth orange, papillose, cilia 2—4.

HAB.—In damp subalpine woods, not common. Fr. 7—8.

Glen Dole, Clova (*Drummond*). Schehallion (*McIntosh*). Finlarig burn and S. side of Loch Tay (*Stirton*)!! Trosachs and by Loch Ard; Glen Strae, Dalmally (*Braithwaite*)!! Head of Hawes water (*Dalton* 1818). Naddle Forest (*Dalton*). Borrowdale, Cumberland (*Clowes*).

## 19. SEMATOPHYLLUM Mitt.

Journ. Linn. Soc. viii, 5 (1864).

Small cæspitose mosses with creeping stems, pinnately branched. Leaves small, glossy, smooth, basal cells oblong, fulvous, with 3—6 at basal angles large and conspicuous. Capsule small, oblong, on a slender seta, lid conic with a long subulate beak, calyptra cucullate, peristome of *Hypnum*.—Der.  $\sigma\eta\mu\alpha$  a mark, and  $\phi\upsilon\lambda\lambda\omicron\nu$  a leaf.

A great and natural genus of some 150 species, the larger number of which are found in S. America. We have only three species in Europe.

### CLAVIS TO THE SPECIES.

Autoicous; leaves lanceolate, entire.  
Dioicous: leaves obovate rounded, serrulate.

*demissum*,  
*micans*.

1. **SEMATOPHYLLUM DEMISSUM** (*Wils.*) *Mitt.*

Autoicous; in creeping glossy yellowish-green tufts. Leaves crowded, erecto-patent and subsecund, broadly lanceolate, acute, entire, nerveless. Capsule cernuous, narrow ovate, lid with a long acute beak. (T. CXIII, A.)

SYN.—*Hypon demissum* WILS. Eng. Bot. Suppl. t. 2740 (1832), in Hook. Br. fl. ii, p. ix (1833), Bry. Brit. 401, t. 59 (1855). TAYL. in MACK. Fl. Hib. 39 (1836). DE NOT. Syllab. 57 (1838). C. MUELL. Synops. ii, 327 (1851). BERK. Handb. 95, t. 11 (1863). HOBK. Synops. 157 (1873). BOULAY Musc. Fr. 100 (1884).

*Hypon flavescens* WILS. MSS. et in Hook. Br. fl. ii, 79 (1833).

*Hypon Schimper* BRUCH MSS. RABENH. D. kr. fl. II, S. 3, 286 (1848).

*Rhynchostegium* (§ *Raphidostegium*) *demissum* BR. SCH. Bry. Eur. fasc. 49—51, p. 4, t. 1 (1852). LESQ. JAMES Moss. N. Amer. 355 (1884).

*Rhynchostegium* (§ *Raphidorrhyncha*) *demissum* SCHIMP. Synops. 564 (1860), 2 ed. 678.

*Sematophyllum demissum* MITT. Journ. Linn. Soc. viii, 5 (1864).

*Raphidostegium demissum* DE NOT. Cronaca II, 31 (1867), Epilogo 182 (1869). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 235 (1897).

*Eurhynchium demissum* MILDE Bry. Siles. 308 (1869). HUSNOT Musc. gall. 343, t. 99 (1893).

*Plagiothecium demissum* DIX. JAMES. Stud. Handb. 439 (1896).

Autoicous; in creeping glossy yellow-green or rufescent patches; stem prostrate, radiculose, with short decurved terete branches. Leaves crowded, erecto-patent or loosely imbricated or subsecund, broadly lanceolate, acute, concave, entire at margin, nerves obsolete; cells narrow, slightly flexuose, basal orange, narrow at the angles 3 or 4 inflated, rectangular, orange or hyaline. Perich. bracts erect, elongate, lanceolate, acute; seta purple smooth; capsule horizontal, regular, yellowish-brown, longish ovate, strongly contracted below the mouth when dry, lid large, conic with a long acute beak, peristome deep yellow, cilia short or imperfect. Perigonial bracts yellow, oval.

HAB.—Wet rocks, rare. Fr. 7—8.

Cromaglow and O'Sullivan's cascade, Killarney (*Wilson* 1829)!! Kenmare and Glengarriff. Beddgelert, N. Wales (*Wilson*). Near Keswick, Cumberland (*Carrington & Pearson* 1884).

2. **SEMATOPHYLLUM MICANS** (*Wils.*)

Dioicous; in glossy yellow-green patches. Stem prostrate, very slender, with short simple branches. Leaves patent, roundish-ovate, apiculate, serrulate, obscurely two-nerved at base. Capsule ovate, lid conical, the beak deflexed or curved upward. (T. CXIII, B.)



SYN.—*Hypnum micans* (non SWARTZ) WILS. in HOOK. Br. fl. ii, 86 (1833), Bry. Brit. 402, t. 59 (1855). TAYL. in MACK. Fl. Hib. P. 2, 42 (1836). C. MUELL. Synops. ii, 290 (1851). SCHIMP. Synops. 2 ed. 784 (1876). HUSN. Musc. Gall. 414, t. 120 (1894). DIX. JAMES. Stud. Handb. 487 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 544 (1899).

*Hypnum Novæ Cæsareæ* AUSTIN Musci Appalach. no. 440 (1870).

*Leskea micans* HOBK. Synops. 143 (1873).

*Chrysobryum micans* LINDB. SULLIV. Icon. musc. Suppl. 91, t. 67 (1874).

*Rhynchostegium Novæ Cæsareæ* AUSTIN in COULTER Bot. Bulletin i, 30 (1876).

*Hypnum* (*Rhaphidostegium*) *Novæ Cæsareæ* LESQ. JAMES Moss. N. Amer. 356 (1884).

*Raphidostegium micans* RENAULD in Rev. bryol. 1883, p. 47.

*Calliergon micans* KINDB. Eur. & N. Amer. Bryinæ 85 (1897).

*Raphidostegium Novæ Cæsareæ* REN. CARDOT Musci Amer. sept. 54 (1893).

Dioicous; prostrate in dense glossy yellow-green or brownish patches. Stem creeping, 1 in. long, branches attenuated, with few short incurved ramuli and a few lanceolate paraphyllia; stem-leaves erecto-patent, narrowed at the non-decurrent base, broadly obovate or rounded, very concave, shortly apiculate, margin slightly recurved, serrulate in the upper half, obscurely two-nerved or nerveless; cells narrowly fusiform, empty, at base yellow, rectangular, at angles about 12, hyaline inflated, quadrate and oval. Perich. bracts radiculose at base, erect, lanceolate-acuminate, distantly serrated, the inner just overtopping the vaginula, seta very slender cygneous, purple; capsule subcernuous or horizontal, obovate, nearly regular, tapering at neck, lid conic, rostrate, the beak rather obtuse, deflexed or sometimes turned upward; annulus of 1—2 rows of irregular cells, peristome yellow, the teeth lanceolate, papillose in the upper half, endostome with a high basal membrane, the processes as long as peristome, narrowly fenestrate in middle line and without cilia. Male plant slender, more erect, the inflorescence gemmiform, scattered along the stem, which is nearly simple.

HAB.—Wet shady rocks, rare.

Glengariff (*Miss Hutchins* 1809). O'Sullivan's cascade, Cromaglow and Fila Doun, Killarney (*Wilson* 1829)!! Borrowdale ♂ plant (*Wilson* 1864)! Succoth hill, Arrochar (*McKinlay* 1866)! Invermoidart, W. Inverness in 2 stations (*MacVicar*)!!

For the opportunity of figuring the fruit of this lovely moss, I am indebted to the kindness of my friend Mrs. Britton, who had sketches made from the fertile plant in Austin's herbarium. The moss is frequent in the Alleghany mountains of Pennsylvania, where the fruit was found by Wolle and Rau in 1874. *Hypnum micans* SWARTZ (Adnot. botan. 1829) = *H. albulum* C. MUELL. Synops. ii, 280, and belongs to the genus *Plagiothecium* which may well retain Swartz's name without interfering with the present species. Austin to avoid this duplication changed the name to *Novæ Cæsareæ*, by which it is known in America.

20. STEREODON (*Brid.*) *Mitt.*

Bryolog. univ. ii, 550 (1827).

Procumbent or creeping mosses, growing on rocks, walls or trunks of trees. Stems depressed or ascending, irregularly pinnate, paraphyses only at base of branches. Leaves generally falcato-secund and arranged distichously, diversiform, nerves two, short or obsolete, cells narrow and linear, small and quadrate at angles, often coloured. Perich. bracts plicate, capsule curved, cylindraceous, lid conical, endostome more or less perfect.—Der. *στερεος* entire, *οδους* a tooth.

This fine genus, embracing about 100 species, depends more on natural habit than on structural differences, and the name was applied as a subgenus of *Hypnum* by Bridel to species in which the processes of the endostome were not perforated. This character is variable, and not sufficient to support a genus, and Mitten adopted it for the group of which *H. cupressiforme* is the type. The bifarious arrangement of the falcato-secund leaves is very striking, but besides there are also in front, a central row with an intermediate row on each side, of smaller non-falcate leaves, and a corresponding set at the back of the stem, the longer falcate leaves are however so densely placed, that it is difficult to observe the intermediate leaves which are much fewer, and often never developed.

## CLAVIS TO THE SPECIES.

- |  |                        |
|--|------------------------|
| Leaves bifarious, falcato-secund.                          |                        |
| Angular cells large, inflated.                             |                        |
| Acumen short, rather obtuse.                               |                        |
| _____ subulate, long, serrulate.                           | <i>Lindbergii.</i>     |
| _____ very long, entire.                                   | <i>imponens.</i>       |
| _____ many, small, quadrate.                               | <i>callichrous.</i>    |
| Leaf margin revolute nearly all its length.                |                        |
| _____ plane, entire.                                       | <i>revolutus.</i>      |
| _____ serrated in upper half.                              | <i>Bambergeri.</i>     |
| Leaves not auricled, angular cells hyaline.                |                        |
| _____ with rounded auricles of brown cells.                | <i>Canariensis.</i>    |
| _____ recurved only at base.                               | <i>circinalis.</i>     |
| Leaves recurved.   |                        |
| _____ turned upward.                                       | <i>cupressiformis.</i> |
| _____ not differing from the others.                       | <i>resupinatus.</i>    |
| _____ spreading on all sides, secund at point of branches. | <i>hamulosus.</i>      |
| Auticous; with quadrate angular cells.                     |                        |
| Capsule curved.  |                        |
| _____ erect.   | <i>incurvatus.</i>     |
| Dioicous; angular cells not differing from rest.           | <i>polyanthos.</i>     |
| Plant slender, leaves not plicate.                         |                        |
| _____ robust, leaves plicate.                              | <i>subrufus.</i>       |
|  | <i>rufescens.</i>      |

Sect. A. DREPANIUM (*Schimp.*) *Mitt.* Capsule inclined, arcuate processes of endostome pellucid. Leaves bifarious, falcato-secund.

1. **STEREODON LINDBERGII** Mitt.

Dioicous; in very pale tufts, stem ascending with few distant branches. Stem-leaves large, falcato-secund, widely ovato-lanceolate, with a short broad point, entire, or with a few teeth at point, nerves two, short, cells at angles hyaline, inflated. Capsule long, ovate, incurved, lid convex-conic. (T. CXIII, C.)

SYN.—*Hypnum palustre* Var. *β. viride* HARTM. Skand. fl. 3 ed. 313 (1838).

*Hypnum curvifolium* (non HEDW.) C. MUELL. Synops. ii, 292, p.p. (1851).

*Hypnum pratense* Var. *β.* WILS. Bry. brit. 399 (1855).

*Hypnum arcuatum* (non HEDW. nec SULLIV.) LINDB. in Oefv. Kon. vetens. Akad. foerhandl. 1861, p. 371. HARTM. Skand. fl. 8 ed. 516 (1861). DE NOT. Epilogo 180 (1869). SCHIMP. Synops. 2 ed. 758 (1876). HUSN. Musc. Gall. 406 (1894).

*Hypnum patientiæ* LINDB. Op. c. ut. synon. MILDE Bry. Siles. 363 (1869). HOBK. Synops. 2 ed. 225 (1884). BOULAY Musc. Fr. 36 (1884). DIX. JAMES. Stud. Handb. 474 (1896).

*Hypnum pratense β. hamatum* SCHIMP. Synops. 628 (1860).

*Hypnum Lindbergii* MITT. Journ. Bot. 1864, p. 122. HARTM. Skand. fl. 9 ed. 20 (1864). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 498 (1899).

*Hypnum viride* (non LAMK.) LINDB. in Acta soc. sci. fenn. X, 98 (1871).

*Hypnum pratense* Var. *arcuatum* MOL. Moost. Alg. Alp. 108 (1865).

*Stereodon (Drepanium) arcuatus* LINDB. Musc. scand. 38 (1879).

Dioicous; in lax, very pale yellowish-green glossy tufts; stems red ascending, irregularly and distantly branched. Stem-leaves crowded, falcato-secund, widely ovato-lanceolate with short blunt points, very concave, entire, faintly serrate at point, nerves two, short and double, sometimes one; cells narrow and pointed, at base yellow longish oval, at the concave angles large, oval-hexagonal, inflated and hyaline. Branch-leaves longer-pointed, narrower. Perich. bracts pale, erect and sheathing, lanceolate, plicate, seta purple, capsule brown, horizontal, longish ovate, curved, lid convex-conic, orange, teeth of peristome yellow, united at base.

HAB.—Marshy ground in woods and moors, not common.

About Warrington (*Wilson*). Frequent in N. Yorkshire (*Spruce*)!! Near Newton Viaduct, Lancs. (*Wilson*). Bantry (*Miss Hutchins*). Near Montrose (*Miss Lyall*)!!

The fruiting plant is very rare, and the one drawn was collected by Lindberg near Stockholm. Its pale whitish brown colour is peculiar and characteristic.

2. **STEREODON IMPONENS** (Hedw.) Brid.

Dioicous; growing in expanded yellowish-green or rufescent tufts. Stems pinnate, paraphyllia lanceolate or palmate. Stem-leaves falcato-

secund, gradually lanceolate-subulate, serrated at point, margin reflexed at base, nerves two, short, cells at base rectangular, at angles quadrate, orange. Capsule cylindric, suberect. (T. CXIII, D.)

SYN.—*Hypnum imponens* HEDW. Sp. musc. 290, t. 77 (1801). RICH. in MICH. Fl. Amer. bor. ii, 315 (1803). BRID. Sp. musc. II, 220 (1812), Mant. 179 (1819). SCHWAEGL. Suppl. I, P. II, 291 (1816). C. MUELL. Synops. ii, 291 et *β. chrysocytus* (1851). BR. SCH. Bry. Eur. fasc. 57—61, p. 28, t. 17 (1854). SCHIMP. Synops. 624 (1860), 2 ed. 754. MILDE Bry. Siles. 360 (1869). HOBK. Synops. 173 (1873). LESQ. JAMES MOSS. N. Amer. 393 (1884). HUSN. Musc. Gall. 404, t. 116 (1894). DIX. JAMES. Stud. Handb. 473 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 470 (1899).

*Hypnum Stereodon imponens* BRID. Bry. univ. ii, 618 (1827).

*Hypnum cupressiforme* \* *imponens* BOULAY Musc. Fr. 34 (1884).

Dioicous; in spreading flat green or yellow-green tufts, pinnate, the branches spreading in two rows, slender, hooked. Paraphyllia lanceolate and palmate. Stem-leaves crowded, falcato-secund to each side, from a scarce decurrent broadly ovate base, lanceolate-subulate, concave, the margin reflexed at base, serrate towards point; nerves two, very short, cells narrow, linear, pointed, somewhat flexuose, empty, at base elongated rectangular, yellow, at the concave angles a cluster of large orange quadrate cells. Perich. bracts few, erect, inner broadly lanceolate with a long subulate point, many-plicate nerveless, serrate at point; seta reddish, capsule suberect, cylindric, a little curved, castaneous; lid convex with an acute point; peristome yellow papillose.

HAB.—On the ground on heaths and rocks, rare.

Reigate heath, Surrey (Mitten 1864)!! Strensall common, York (Spruce 1859). Oxshott common, Surrey (M. Lawson)!! Ben Lawers (Meldrum)!! Fritham plain, New Forest (Holmes 1875). Copthorne common, Sussex (W. E. Nicholson).

### 3. *STEREODON BAMBERGERI* (Schimp.) Lindb.

Dioicous; in dense tufts, fuscous, yellowish and green, erect, sparingly branched. Leaves bifarious, glossy, from an erect base, subcircularly recurved, oblongo-lanceolate-subulate, very concave, entire, nerve short, forked or obsolete, cells at basal angles few, small quadrate, orange. Capsule cylindraceous. (T. CXV, A.)

SYN.—*Hypnum Bambergeri* SCHIMP. Synops. 698 (1860), 2 ed. 763. BRAITHW. in Science Gossip iv, 62, fig. 47 (1868). HOBK. Synops. 173 (1873). LESQ. JAMES MOSS. N. Amer. 397 (1884). HUSN. Musc. Gall. 401, t. 115 (1894). DIX. JAMES. Stud. Handb. 476 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 473 (1899).

*Stereodon (Drepanium) circularis* MITT. Journ. Linn. Soc. viii, 42 (1865).

*Stereodon Bambergeri* LINDB. Musc. scand. 38 (1879).

Dioicous ; in dense glossy brownish-green tufts, rust-coloured at base ; stems 2—4 in. high, erect, branches short and irregular, leaves densely crowded, bifarious, secund, from an erect, longish ovate base, gradually lanceolate, circularly falcate, with a flexuose subula, margin entire ; cells incrassate linear, at base orange, at angles a cluster of small quadrate and oval orange cells. Perich. bracts sheathing, lanceolate, plicate, nerveless, serrate at apex, suddenly extended in a long recurved subula, seta reddish, capsule cylindraceous, curved, dark brown, lid orange, conical ; peristome yellow.

HAB.—Calcareous rocks and detritus on mountains, very rare.

Near summit of Ben Lawers (*Dr. Frazer* 1867)!! *Craig Chailleach* (*Dixon & Binstead* 1898)!!

The fruit has only once been found, and that by *Dr. Adlerz* in 1885 at Kongs vold in the Dovrefeld, but the sterile plant occurs throughout the Tyrol and in Switzerland.

#### 4. *STEREODON CUPRESSIFORMIS* (L.) *Brid.*

Dioicous ; procumbent, subpinnate, in spreading yellow-green tufts. Stem-leaves falcato-secund, bifarious, imbricated, longly lanceolate-acuminate, serrated at point, shortly 2-nerved or nerveless, basal cells rectangular, at angles 5 or 6 rows of quadrate hyaline or yellow cells. Perich. bracts erect, lanceolate, piliform at point ; capsule subcylindric, curved, subcernuous, lid conico-rostellate. (T. CXIII, E.)

SYN.—*Muscus terrestris medius, supinus et repens, foliis crebris in acutos mucrones productis* RAY  
Synops. 2 ed. 37 (1696).

*Hypnum repens crispum cupressiforme minus* DILL. Cat. Giss. 217 (1718).

*Hypnum crispum cupressiforme, foliis aduncis* DILL. Hist. musc. 287, t. 37, f. 23 (1741),  
et Herb.

*Hypnum filicinum sericeum, molle et pallidum mucronibus aduncis* DILL. Hist. musc. 286,  
t. 36, f. 22, A. B. et Herb.

*Hypnum myosuroides scriceum tenuius, capsulis erectis* DILL. Hist. musc. 318, t. 41, f. 53,  
et Herb.

*Hypnum cupressiforme* L. Sp. plant. 1126 (1753), Syst. nat. ii, 704. HUDS. Fl. angl. 424 (1762). WEISS Crypt. Goett. 238 (1770). NECK. Meth. musc. 165 (1771). WITHER. Bot. arrang. ii, 686 (1776). LIGHTF. Fl. Scot. ii, 752 (1777). WEB. Spic. fl. Goett. 65 (1778). RELHAN Fl. Cant. 411 (1785). ROTH Fl. Germ. i, 468 (1788). SIBTH. Fl. Oxon. 298 (1794). HOFFM. Deutsch. fl. ii, 63 (1795). HEDW. Musc. frond. iv, 59, t. 23 (1797), Sp. musc. 292. BRID. Musc. rec. II, P. II, 134 (1801), Sp. musc. II, 211 (1812), Mant. 178 (1819). SM. Fl. Brit. 1331 (1804), Eng. Bot. t. 1860. TURN. Musc. Hib. 193 (1804). SCHULTZ Fl. Starg. 327 (1806). WEB. MOHR Bot. Tasch. 370 (1807). WAHLENB. Fl. Lapp. 377 (1812). ROEHL. Deut. fl. iii, 116 (1813). SCHWAEGL. Suppl. I, P. II, 290 (1816). HOOK. TAYL. Musc. Br. 113 (1818). HOOK. Fl. Scot. P. 2, 148 (1821). GRAY Nat. arr. i, 766 (1821). FUNCK Moost. 65, t. 49 (1821). HUEBEN. Musc. Germ. 682 (1833). DE NOT. Syllab. 55 (1838), Epilogo 179 (1869). RABENH. D. kr. fl. II, S. 3, 271 (1848). C. MUELL. Synops. ii, 289 (1851). WILS. Bryol. Brit.



397 (1855). BR. SCH. Bry. Eur. fasc. 57—61, p. 25, t. 14, 15 (1854). SCHIMP. Synops. 625 (1860), 2 ed. 755. BERK. Handb. 125, t. 11 (1863). MILDE Bry. Siles. 361 (1869). HOBK. Synops. 173 (1873). BOULAY Musc. Fr. 31 (1884). LESQ. JAMES Moss. N. Amer. 394 (1884). HUSN. Musc. Gall. 404, t. 116 (1894). DIX. JAMES. Stud. Handb. 470 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 484 (1899).

*Neckera cupressiformis* WILLD. Prodr. fl. Berol. 936 (1787).

*Hypnum nitens* TIMM. Prodr. fl. Megap. no. 828 (1788).

*Hypnum decipiens* HOFFM. Deutsch. fl. ii, 73 (1796).

*Hypnum nigro-viride* DICKS. Fasc. crypt. IV, 18 (1801).

*Hypnum Stereodon cupressiforme* BRID. Bry. univ. ii, 605 (1827).

Dioicous; growing in flat expanded tufts, glossy, pale green, olivaceous or brownish, sometimes blackish green. Stem creeping, ascending or suberect, distantly or regularly pinnate, branches ascending more or less falcate at point, with very few subulate paraphyllia. Leaves dense in two rows, imbricated, falcato-secund or hooked, lanceolate, gradually running out into a long subulate point, slightly decurrent at base, concave, not plicate, margin often recurved on one side above the base, entire or serrulate in the point, nerves none or two very short ones. Cells linear-vermiform 10—15 times long as broad, incrassate and rectangular at base, at angles a group of 5—6 rows of vesicular hyaline, incrassate quadrate cells, often opaque with granules; branch-leaves smaller and narrower. Perich. bracts pale, outer divergent, inner sheathing, elongate lanceolate, acuminate, nerveless, seta purple; capsule cernuous or suberect, cylindraceous, lightly curved, castaneous; lid convex, rostellate, annulus orange of two rows, teeth united at base rufous, endostome yellowish, papillose, processes perforated, cilia 2—3. Male infl. gemmiform, the bracts ovate, with long subulate recurved points.

HAB.—On the ground, stone walls, thatched roofs, tree-trunks, very common. Fr. 10—2.

Var. *β. tectorum* Bry. eur. l. c. t. 15, f. B. 1—2.

In dense tumid, yellow-green and brownish tufts, with flat margins. Stems stout, trailing, pinnate, the branches close, curved, erect. Leaves densely imbricated, oval, acuminate, secund and decurved at points. Capsule shorter, incurved, lid rostellate.

HAB.—On roofs and walls.

Sand hills, St. Annes, Lanc. (Beesley 1901)!!

Var. *γ. brevisetum* Schimp. Synops. 626.

In dense yellow-green cushions, with many unequal, short stiff and pointed branches. Leaves scarcely secund, longish-oval, concave, with a fine point, entire. Capsule on a short seta, lid acute.

HAB.—On old woodwork.

Var. *δ. uncinatus* Bry. eur. l. c. t. 15, *δ.* 1—3.

In spreading depressed yellowish-green tufts, the stem pinnate with many hooked branches. Leaves elongated with long points, margin recurved at base. Capsule small, cylindric, curved, lid pointed.

HAB.—On the ground and base of trees.

Var. *ε. ericetorum* Bry. eur. l. c. t. 15, *f. γ.* 1—4.

In lax soft pale green tufts, stem 3—4 in. long, slender ascending, almost regularly pinnate. Leaves broad, strongly falcate, serrulated all round, the angular cells large and hyaline. Seta long, capsule cernuous, ovato-cylindric, curved, lid acutely rostellate.

HAB.—Heaths and shady woods.

Among heather in Rowardennan Glen, Loch Lomond (*R. Kidston*)!! Beddgelert (*Hunt*)!!

Var. *ζ. longirostris* Bry. eur. l. c. t. 15, *f. δ.* 1—5.

In interwoven depressed dark-green tufts; stems slender, with numerous branches and ramuli, irregularly pinnate, the branches of unequal length. Leaves divergent, slightly secund, less falcate, longish lanceolate, fine pointed. Capsule suberect, slender and curved, lid long, with a slender beak.

HAB.—Wet places and about tree-roots.

Var. *η. elatus* Bry. eur. l. c. t. 15, *f. η.* 1—6.

Robust, resembling *H. rugosum*, in lax brownish-green or rufescent tufts; stems 3—4 in. long, tumid, with erect slender branches. Leaves broad, longish-oval, with a short point, very concave, slightly secund. Capsule erect, cylindric.

SYN.—*Hypnum repens crispum lutescens, montanum et majus* DILL. Cat. Giss. 217 (1718).

*Hypnum cupressiforme* Var. *lacunosum* BRID. Musc. rec. II, P. II, 136.

HAB.—Damp heaths, not common.

Miller's Dale (*Wilson*). Kenmare (*Taylor*). Elburton, Plymouth (*Holmes* 1868)!! Guernsey (*Salwey*)! Kilconquhar, Fife (*Ewing* 1883)!! Cliffs at Durness, Sutherland (*Dixon* 1899)!!

Var. *θ. mamillatus* BRID. Musc. rec. II, P. II, 137 (1801).

In dense, depressed, glossy yellowish-green tufts; stem long, slender, pinnate, the branches rounded, filiform. Leaves of equal size, falcato-secund, longish-lanceolate, with long, serrated points. Capsule almost symmetric, lid convex, obtuse with a short point.

SYN.—*Hypnum cupressiforme* Var. *mamillatum* BRID. Bry. univ. ii, 608. Bry. eur. l. c. t. 15, *f. ε.* 1—5.

*Stereodon cupressiformis* \* *mamillatus* LINDB. Musc. scand. 38.

HAB.—On slaty rocks. Killarney and Conner Hill, Ireland (*Wilson*).

Var. *ι. filiformis* (HUDS.)

Tufts adpressed and dependent; stem very long and slender, with long filiform branches hanging down parallel to each other. Leaves flat, curved falcately downward or diverging on all sides, usually serrated; branch-leaves longish-lanceolate. Capsule small, lid with a longish beak.

SYN.—*Hypnum repens trichodes terrestre, priori viridius et minus, capitulis cernuis minus tumidis* DILL. Cat. Giss. 216 (1718).

*Hypnum sericeum ramosus et tenuis, capsulis acuminatis* DILL. Hist. musc. 327, t. 42, f. 62, et Herbar.

*Hypnum filiforme* HUDS. Fl. Angl. 2 ed. 497 (1778).

HAB.—Trunks of trees and rocks, fruit very rare.

Beddgelert (*Wilson* 1833)!! Ben Lomond (*Braithwaite* 1896)!! Eagle's nest, Killarney (*Braithwaite* 1900)!!

This most polymorphous species is a great trouble to the young collector, and I used to think the opaque quadrate angular cells sufficient to settle it, but in some forms or in old plants these become pellucid. Again the varieties differ remarkably in size and habit, the leaves however are pretty uniform in structure and afford the best means of identification.

5. **STEREODON RESUPINATUS** (*Wils.*)

Diocious; in flat olivaceous-green tufts. Stem creeping, leaves secund, turned upward, ovato-lanceolate, symmetric, acuminate, scarcely falcate, nerveless, entire. Capsule erect, nearly symmetric, lid rostrate. (T. CXIV, A.)

SYN.—*Hypnum multiflorum* (non SCHWÆG.). TAYL. in MACK. Fl. Hib. P. 2, 46 (1836).

*Hypnum cupressiforme* Var. *resupinatum* SCHIMP. Coroll. 133 (1856), et Synops. Husnot, Dixon.

*Hypnum polyanthos* (non SCHREB.) SM. Eng. Bot. t. 1664, Fl. Brit. 1278 (1804.) TURN. Musc. Hib. 137 (1804).

*Hypnum resupinatum* WILS. Bry. Brit. 398 (1855). HOBK. Synops. 174 (1873). BOULAY Musc. Gall. 34 (1884). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 489 (1899).

Diocious; in depressed, flat olive-green glossy tufts. Stem creeping, radiculose, secondary divisions ascending, pinnate with close, erect, filiform, pointed branches. Leaves crowded, imbricated or slightly secund, concave, entire, all pointing upwards and forwards, those of main stem longish ovate, symmetric, gradually acuminate, narrowed at base, the nerves indistinct; those of branches lanceolate acute; cells linear, pointed, at the concave angles yellow, quadrate and rectangular.

Perich. bracts erect, attenuated, entire, seta pale red; capsule erect or inclined, cylindric, ferruginous, lid with a long slender beak.

HAB.—Walls, rocks and tree trunks, not uncommon. Fr. 10—12.

Mr. Beesley finds it very fine and frequent about Preston, Lancs. It is rare on the continent, except in Jutland, and coasts of Holland and France. Its chief distinction from *cupressiformis* lies in the direction of the leaves and their symmetric form, as well as the rostrate lid, but the var. *longirostris* comes very close; it has however a distinctly different aspect.

Var. *β. tenuis* Hook.

Stems very slender, the leaves narrowly lanceolate, only slightly curved; capsules long and narrow, lid rostrate.

SYN.—*Hypnum cupressiforme* Var. *tenuis* Hook. Musc. Brit. 113 (1818)

HAB.—Trunks and branches of trees.

Frequent near Muckcross Abbey, Killarney, and I have found it in fine fruit, by the Orchy above Dalmally. Corresponds to var. *filiforme* of last species.

## 6. STERODON REVOLUTUS. Mitten.

Dioicous; densely tufted, the stem procumbent, pinnate. Leaves falcato-secund oblong-oval, shortly and broadly acuminate, with many longitudinal plaits, nerves two very short, margin entire, revolute, cells linear-vermiform short with blunt ends, at angles many, small and quadrate. (T. CXIV, B.)

SYN.—*Stereodon revolutus* MITT. Journ. Linn. Soc. i, Suppl. 97 (1859).

*Hypnum cupressiforme* Var. *implexum* SENDTN. MS.

*Hypnum Heufleri* JURATZ. in Verh. zool.-bot. Ges. Wien 1861, p. 431. DE NOT. Epilogo 176 (1869). SCHIMP. Synops. 2 ed. 760 (1876). BOULAY Musc. Fr. 38 (1884). HUSN. Musc. Gall. 402, t. 116 (1894).

*Hypnum revolutum* LINDB. in Hedwigia 1868, p. 108. LIMPR. in RABENH. D. kr. fl. Laubm. iii, 479 (1899).

Dioicous; in dense tufts, yellowish-brown above, ochraceous at base, rather glossy. Stems erect, fasciculate, pinnate, and with simple stems intermixed, some subulate or lanceolate paraphyllia in the axils of the leaves; branches turned to one side, hooked at points. Stem-leaves densely crowded falcato-secund, ovate at base, gradually lanceolate-subulate, concave, irregularly plicate, nerves two, short, margin entire, revolute; cells linear-vermicular, with obtuse ends, 4—7 times long as broad, yellowish at base, at angles a group of yellow quadrate cells.

Branch-leaves smaller. Seta purple, flexuose; capsule horizontal, strongly contracted below mouth.

HAB.—Rocks near summit of Ben Lawers (*Jameson* 1890)!!

The fruit of this moss has only been found twice—near Heilingenblut by Molendo, and by Jeanbernat in the Pyrenees. A closely allied and more widely distributed species,—*Ster. fastigiatus* BRID.—ought also to be found here, but is more attached to calcareous localities.

## 7. STEREODON CANARIENSIS Mitt.

Dioicous; cæspitose, the stem procumbent, pinnate. Leaves falcato-secund compressed; ovato-lanceolate, gradually acutely pointed, margin of the upper half sharply serrulate, the cells narrow, linear, at angles quadrate, hyaline. Perich. bracts erect, elliptic-lanceolate, serrulate at apex; capsule short, oval unequal, horizontal; lid conic acuminate. (T. CXIV, C.)

SYN.—*Stereodon Canariensis* MITT. Journ. Linn. Soc. viii, 5 (1864).

*Hypnum Canariense* HOBK. Synops. 2 ed. 222 (1884). DIX. JAMES. Stud. Handb. 477 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 472 (1899).

*Hypnum subcupressiforme* HAMPE.

*Hypnum Waghornii* KINDB. Cat. Canad. Musc. 234 (1892).

Dioicous; in flat dense tufts, rather glossy, bright green or light fuscous in old plants; stem creeping, pinnate, the branches spreading horizontally, pointed, paraphyllia lanceolate. Stem-leaves crowded, slightly falcato-secund, not decurrent, from an ovate base, gradually lanceolate, acuminate, margins plane, sharply serrate above the middle, nerves indistinct or none; cells narrowly linear above, yellow and rectangular at base, quadrate and rectangular, hyaline and about 25 at basal angles. Perich. bracts erect, divergent and serrate at points, lanceolate-acuminate; seta red, capsule cernuous or horizontal, castaneous, ovate, not curved, wide-mouthed; lid convex with an acute point, annulus of 2—3 rows; teeth united at base, orange, incurved when dry, pale and papillose at point, endostome smooth, processes split in the middle, cilia two.

HAB.—Wet rocks.

Torc mountain, Killarney c. fr. (*Wilson* 1829)! Cromaglow (Hunt 1867)! On tree-trunks, O'Sullivan's cascade (*Lindberg* 1873)!!

By both the former bryologists this moss was referred to *S. cupressiforme*, and more recently confusion has arisen between it and the next species, as it appears that the range of the two at Killarney is identical. The capsule in



*S. Canariensis* is short and wide, resembling that of *C. molluscum*, and the leaf-cells are extremely narrow, measuring according to Mitten  $\frac{8}{100}$  in. long by  $\frac{5}{100}$  in. wide. In size and habit both *Canariensis* and *circinalis* are very much alike, the form of leaf-base and apex, marginal serration and cells are what we must rely upon to distinguish them.

## 8. STERODON CIRCINALIS (*Hook.*) *Brid.*

Stem creeping, pinnate; leaves lanceolate-subulate, circinato-falcate, secund, subserrate, narrow at base, with rounded auricles occupied by brown or yellow cells. Capsule oval, curved cernuous, lid conical, pointed. (T. CXIV, D.)

SYN.—*Hypnum circinale* HOOK. Musc. exot. ii, 21, t. 107 (1820). BRID. Bry. univ. ii, 621 (1827). C. MUELL. Synops. ii, 318 (1851). LESQ. JAMES MOSS. N. Amer. 392 (1884). CARDOT in Rev. bryol. 1890, p. 17.

*Hypnum Sequoiæ* C. MUELL. in Flora 1875, p. 91.

Dioicous; growing in brownish green or straw-coloured patches, soft and rather glossy. Stem creeping slender flexuose, pinnate, with few simple unequal branches; leaves from an ovate base, incurved at margin, lanceolate; suddenly narrowed into a subulate, falcato-secund acumen half length of leaf, base narrow at insertion, with rounded auricles, sometimes wanting on one side, margin distantly serrulate in the upper half, cells above narrow linear, at base yellow, quadrate, at angles the auricles occupied by about 20 small quadrate and angular cells, mostly dark orange-brown. Perich. bracts thin, sheathing, serrated, lanceolate, extended into a long slender subfalcate acumen; seta rufo-fuscous flexuose, capsule cernuous, oval gibbous; processes of endostome imperforate, cilia 1—2, of same length.

HAB.—On rocks, Cromaglow, Killarney. Male and sterile female plants intermixed (*Moore. Hunt* 1867. *Binstead* 1896)!! Chapel above Galways bridge, Kenmare road (*Binstead* 1900)!!

To the sharp-sighted M. Cardot we owe the detection of this moss as a native, specimens having been collected by D. Moore and named "*H. hamulosum*?" which he found were *circinalis*. It was first collected by Menzies on trees, in N. West America in 1793, and is closely allied to the last species, from which it differs by the large rounded auricles with dark brown cells, and the subulate acumen forming half the length of the leaf, which is only slightly serrulate and sometimes quite entire. The leaf cells also differ considerably from those of *Canariense*, being shorter and wider, and in the American plant the auricular cells are but faintly tinged with brown.

9. **STEREODON CALLICHOUS** *Brid.*

Diocious; procumbent, pinnate, in pale soft yellowish tufts. Leaves circinato-secund, ovate-lanceolate, acuminate, nerveless. Perich. bracts erect, attenuated, scarcely serrulate; capsule subcylindric, arcuate, lid conico-acuminate. (T. CXIV, E.)

SYN.—*Hynum Stereodon callichrous* BRID. Bry. univ. ii, 631 (1827).

*Hynum callichroum* HUEBEN. Musc. germ. 685 (1833). RABENH. D. kr. fl. II, S. 3, 271 (1848). C. MUELL. Synops. ii, 294 (1851). BR. SCH. Bry. Eur. fasc. 57—61, p. 27, t. 16 (1854). SCHIMP. Synops. 623 (1860), 2 ed. 753. DE NOT. Epilogo 175 (1869). MILDE Bry. Siles. 359 (1869). HOBK. Synops. 2 ed. 223 (1884). LESQ. JAMES MOSS. N. Amer. 392 (1884). HUSN. Musc. Gall. 402, t. 116 (1894). DIX. JAMES. Stud. Handb. 475 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 495 (1899).

*Hynum hamulosum* WILS. Bry. Brit. 396, t. 58 (1855). BERK. Handb. 124 (1869).

*Hynum rupestre* B. WHITE in Trans. Bot. Soc. Edin. ix, 198 (1868).

*Hynum* (*Harpidium*) *callichroum* SANIO Bryol. Fragm. II, 26 (1887).

Diocious and pseudautoicous; in loose soft turgid tufts, yellow-green or lively green. Stem slender flexuose, procumbent or ascending, pinnate and with tufted radicles, the branches hooked at points; paraphyllia very few, subulate. Stem-leaves crowded, falcato-secund, from a narrow decurrent rounded-ovate base, suddenly lanceolate-subulate, often crumpled above, entire, nerves two, short or none, cells narrow, flexuose in the middle, at angles 2—3 rows of hyaline inflated cells, oval or angular, forming a convex group extending half way to the middle of leaf. Branch-leaves strongly curved, crisped when dry. Perichætium radiculose, pale, spreading, inner bracts lanceolate, acuminate, serrulate above; seta long, purple, capsule cernuous or horizontal, cylindraceous, slightly curved, castaneous; lid orange, conical pointed, annulus of 3—4 rows of cells, peristome yellow.

HAB.—Damp woods and boulders in subalpine districts. Fr. 7—8.

Trosachs (*Lyle*). Clova mountains (*Drummond*). Snowdon (*Nowell*). Craig Chailleach (*Braithwaite* 1860)!! Ben Lawers. Near Leeds (*McIvor* 1845). Moffat dale (*Nicol*).

10. **STEREODON HAMULOSUS** (*Brid.*) *Lindb.*

Diocious; densely cæspitose, yellowish-green, very slender, pinnate, stem-leaves crowded, falcato-secund, ovato-lanceolate, gradually subulate, entire nerveless. Capsule longish-cylindric, cernuous, lid conical, obtuse. (T. CXIV, F.)

SYN.—*Hynum cupressiforme* Var. *hamulosum* BRID. Sp. musc. II, 217 (1812), Bry. univ. ii. 610 (1827).

*Hypnum cupressiforme* Var. *crispatissimum* BRUCH in Pl. norveg. Unio itin. 1828.

*Hypnum hamulosum* Var. *micranthum* WILS. Bry. Brit. 396, t. 58 (1855). BERK. Handb. 124 (1869).

*Hypnum hamulosum* BR. SCH. Bry. Eur. fasc. 57—61, p. 20, t. 10 (1854). SCHIMP. Synops. 621 (1860), 2 ed. 752. LESQ. JAMES MOSS. N. Amer. 391 (1884). HUSN. Musc. Gall. 400, t. 115 (1894). DIX. JAMES. Stud. Handb. 475 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 491 (1899).

*Hypnum callichroides* MOL. in Flora 1863, p. 381 et 396.

*Stereodon hamulosus* LINDB. Musc. Scand. 38 (1879).

*Hypnum chlorochroum* JUR. in lit. MOL. Bayern. Laubm. 260 (1875).

*Hypnum Dovrense* KINDB. in Mem. de Soc. nat. des scien. nat. de Cherb. xxiv, 12 (1885).

Dioicous and pseudautoicous; in dense cushioned tufts, brittle, yellowish-green. Stem slender, ascending, subpinnate, the branches fasciculate, paraphyllia few, lanceolate-subulate. Stem-leaves crowded, strongly falcato-secund, from an ovate base, lanceolate, gradually subulate, margin somewhat recurved at base, serrulate only in the point, nerves two, short; cells narrow, vermiform, obtuse at ends, at base longish-oval, becoming smaller at angles. Perichætium radiculose, the bracts divergent, inner ovate, acuminate, plicate, serrate only at point; seta red, capsule cernuous, cylindraceous, reddish-brown, lid conical obtuse, peristome yellow. Male infl. small sometimes nestling in the radicles.

HAB.—Mountain rocks, rare. Fr. 7—8.

Ben Lawers, Craig Chailleach and other adjacent mountains (*Wilson* 1829)!! Ben Ledi (*Stirton* 1866)! Helvellyn, Long Sleddale & Tarn Crag (*Binstead*, 1885)!!

Sect. B. PYLAIEA (*Br. Sch.*) Mitt. Capsule erect or inclined. Leaves spreading on all sides.

## II. STEREODON INCURVATUS (*Schrad.*) Mitt.

Autoicous; in small green tufts, stem prostrate, with short curved branches. Leaves subsecund, pointing upward, oblong-lanceolate, longly acuminate, entire, nerves two, very short. Capsule cernuous, subcylindric, curved, lid conical. (T. CXV, B.)

SYN.—*Hypnum incurvatum* SCHRAD. Syst. samml. i, 18 (1796). ROTH Fl. Germ. iii, P. I, 287 (1800). BRID. Musc. rec. II, P. II, 119 (1801), Sp. musc. II, 163 (1812), Mant. 169 (1819), Bry. univ. ii, 451 (1827). P. BEAUV. Prodr. 63, excl. syn. Hedw. (1805). WEB. MOHR Bot. Tasch. 342 (1807). ROEHL. Deutsch. Fl. iii, 117 (1813). SCHWAEGL. Suppl. I, P. II, 285, t. 94 (1816). SCHULTZ Fl. Starg. Suppl. 80 (1819). FUNCK Moost. 65, t. 49 (1821). HUEBEN. Musc. germ. 675 (1833). C. MUELL. Synops. ii, 416 (1851). BR. SCH. Bryol. Eur. fasc. 57—61, p. 15, t. 5 (1854). WILS. Bry. Brit. 403, t. 59 (1855), Eng. Bot. Suppl. t. 2839. BERK. Handb. 127 (1863). BOUL. Musc. Fr. 42 (1884). HUSN. Musc. Gall. 398, t. 115 (1894). DIX. JAMES. Stud. Handb. 469 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 456 (1899).

*Hypnum Leskioides* BRID. Sp. musc. II, 177.

*Hypnum Swartzii* BRID. Sp. musc. II, 178.

*Stereodon (Pylaisia) incurvatus* MITT.

*Hypnum (Homomallium) incurvatum* SCHIMP. Synops. 616 (1860), 2 ed. 746. MILDE Bry. Siles. 357 (1869).

*Plagiothecium incurvatum* DE NOT. Epilogo 191 (1869).

*Amblystegium incurvatum* KINDB. Laubm. Schwed. & Norw. 49 (1883).

Autoicous; in small glossy yellowish-green tufts. Stem prostrate, the branches irregular, filiform, short, slightly falcate at points. Stem-leaves erecto-patent or subsecund, lanceolate, gradually subulate-acuminate, flat and entire at margin, nerves two, very short or obsolete. Cells linear, flexuose, elongated at base, quadrate at angles and forming a small triangular group; branch-leaves smaller and crowded. Perich. bracts erect, inner vaginant, lanceolate, longly acuminate, serrulate towards the point, with two longer faint nerves; seta pale red, capsule cernuous or horizontal, cylindraceous, curved, castaneous, contracted below mouth when dry; lid conical, shortly rostellate, peristome yellow, processes of endostome fenestrate along the keel, cilia two, long and nodulose.

HAB.—Rocks and stones in calcareous districts, not common. Fr. 5—6.

Helk's wood, Ingleton (*Nowell*)!! Kendal (*Wilson*, 1838). Natland, Sedgwick & Levens Park, Westmoreland (*Stabler*, 1868). Richmond, Yorks. (*R. Barnes*)!!

This moss resembles several other small species, especially *S. resupinatus* and *polyanthos*, but differs from both by the long acumen to the leaves, and when fertile by the fruit, the capsule in both the others being erect and cylindric. When sterile *S. incurvatus* may be best distinguished by the unsymmetric long-pointed leaf.

## 12. STERODON POLYANTHOS (*Schreb.*) Mitt.

Autoicous; in small bright green tufts, with short erect branches. Leaves erecto-patent, subsecund, oval-lanceolate, acuminate, entire, nerveless. Capsule erect, cylindric, lid conical, peristome inserted below mouth, cilia rudimentary. (T. CXV, C.)

SYN.—*Hypnum polyanthos* SCHREB. Sp. Fl. Lips. 97 (1771). HOOK. TAYL. Musc. Brit. 2 ed. 164, suppl. t. 5 (1827). C. MUELL. Synops. ii, 337 (1851).

*Hypnum myosuroides* β. *filiforme* WEB. Spic. fl. Goett. 93 (1778).

*Leskea polyantha* TIMM Fl. megap. 225 (1788). HEDW. Musc. frond. iv, p. 4, t. 2 (1793), Sp. Musc. 229 (1801). BRID. Musc. rec. II, P. III, 42 (1803), Sp. musc. II, 176 (1812), Mant. 146 (1819), Bry. univ. ii, 311 (1827). WEB. MOHR Bot. Tasch. 251 (1807). SCHWAEGL. Suppl. I, P. II, 179 (1816). GREV. Scott. Cr. fl. iii, t. 151 (1826). HUEBEN. Musc. germ. 582 (1833). DE NOT. Syllab. 62 (1838). RABENH. D. kr. fl. II, S. 3, p. 253 (1848). WILS. Bry. Brit. 331, t. 35 (1855), Eng. Bot. Suppl. t. 2871. HOBK. Synops. 143 (1873).

*Isoetecium polyanthum* SPRUCE Ann. Mag. nat. hist. 1849. BOUL. Musc. Fr. 146 (1884).

*Pylaisia polyantha* BR. SCH. Bry. eur. fasc. 46—47, p. 3, t. 1 (1851). SCHIMP. Synops. 518 (1860), 2 ed. 624. BERK. Handb. 142 (1863). DE NOT. Epilogo 208 (1869). MILDE Bry. Siles. 295 (1869). HOBK. Synops. 2 ed. 196 (1884). LESQ. JAMES MOSS. N. Amer. 308 (1884). HUSN. Musc. Gall. 312, t. 89 (1892). DIX. JAMES. Stud. Handb. 390 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 10 (1899).

*Stereodon polyanthos* MITT. Journ. Linn. Soc. viii, 40 (1864).

Autoicous; in small bright green glossy tufts. Stem creeping, radiculose, subpinnate, the branches short ascending or erect and curved. Leaves erecto-patent, subsecund, ovato-lanceolate, acuminate, somewhat oblique, flat and entire at margin; nerves none or two, very short and obscure. Cells narrow linear, at base rectangular, at angles quadrate and oval, in 4—5 rows. Perich. bracts erect, inner vaginant, broadly lanceolate, serrulate in the short acutely acuminate point; seta purple; capsule symmetric erect, cylindraceous with a short neck, rufescent; lid conical; peristome yellow, endostome paler, processes lanceolate-subulate, longer than the teeth, fenestrate, cilia rudimentary.

HAB.—Trunks and branches of trees, not common. Fr. 7—8.

Darlington (*Backhouse* 1822). Forfar (*Drummond*). Beaumaris (*Wilson* 1830). Killarney (*Moore*)!! Llanberis (*Pearson*)!! Derbyshire (*Wilson*). York (*Spruce*). Bolton Abbey (*Hunt* 1867). Cockmill wood, Whitby (*Braithwaite*).

By most of the older authors this moss appears to have been confused with *S. cupressiformis* Var. *filiformis*, so that it is not possible to separate them by the descriptions; the leaf-cells in the latter, however, are much longer and narrower than in *S. polyanthos*, which, moreover, is generally found with fruit.

### 13. STEREODON SUBRUFUS (*Wils.*) *Lindb.*

Dioicous; slender in silky interwoven lax pale green tufts. Stem creeping with stoloniform prolongations and short branches. Leaves lanceolate-subulate, secund, entire, nerveless, not plicate; cells uniform, flexuose linear. Capsule oblong-oval, tapering at base; lid conical. (T. CXV, D.)

SYN.—*Leskea polyantha*  $\beta$ . *sericeola* BRID. Bry. univ. ii, 313 (1827).

*Leskea irrorata* SENDT. Beob. ueber die klim. verbreit. d. Laubm. 26 (1848).

*Leskea intricata* HARTM. Skand. fl. 5 ed. 336 (1849), non *Pter. intricatum* Hedw.

*Hypnum irroratum* C. MUELL. Synop. ii, 395 (1851).

*Isoetecium homomallum* SPRUCE MS.

*Orthothecium intricatum* BR. SCH. Bry. Eur. fasc. 48, p. 4, t. 3 (1851), Synops. 522 (1860), 2 ed. 630. BERK. Handb. 143 (1863). MILDE Bry. Siles. 292 (1869). HOBK. Synop. 2 ed. 195 (1884). HUSN. Musc. Gall. 317, t. 90 (1892). DIX. JAMES. Stud. Handb. 392 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 17, fig. 355 (1896).

*Leskea subrufa* WILS. Bry. Brit. 334, t. 54 (1855). HOBK. Synops. 145 (1873).

*Holmgrenia intricata* LINDB. Oefv. vet. ak. foerh. (1862) p. 605.



*Pylaisia sericea* DE NOT. *EPILOGO* 207 (1869).

*Stereodon (Pylaisia) subrufus* LINDB. *Musc. Scand.* 38 (1879).

*Pylaisia intricata* (non BR. SCH.) VENT. & BOTT. *Enum.* 19 (1884).

*Isotheicum intricatum* BOUL. *Musc. Fr.* 148 (1884).

*Isotheicum chryseum* (non Schwaeg.) SPRUCE in *Ann. nat. hist.* iii, 147 (1849).

Dioicous ; in lax interwoven olivaceous-green tufts, rufescent at base ; branches slender, suberect or creeping. Leaves subsecund, erecto-patent, lanceolate-subulate, entire, nerveless ; cells flexuose-linear, uniform. Perich. bracts erect, ovato-lanceolate, not plicate, suddenly extended in a long flexuose subula ; seta red ; capsule erect, ovate-oblong, tapering below into a neck, castaneous ; lid conic, oblique, orange ; teeth shorter than the endostome, processes perforated, cilia none.

HAB.—Damp shaded calcareous rocks in subalpine districts ; not rare. Fr. 6.

Nant-y-Fridd (*Wilson* 1833) !! Green's Clough, Malham (*Nowell* 1859) ! Dunoan (*Hunt* 1866) ! Rannoch (*B. White* 1867) ! Buxton (*Hunt* 1867) !! Micklefell (*Binstead* 1882) !! Whitbarrow (*Stabler* 1868). Trcsachs (*Hunt* 1866) !! Ben Bulben, Sligo c. fr. (*Moore* 1854). Millersdale and Cheedale (*Holt* 1880). Cwm Bychan (*Rogers* 1889).

#### 14. *STEREODON RUFESCENS* (*Dicks.*) *Mitt.*

Dioicous ; erect with few branches, in reddish shining tufts. Leaves plicate, erecto-patent, lanceolate-acuminate, subsecund, entire, nerveless. Capsule erect, subcylindric, lid conical, rostellate. (T. CXV, E.)

SYN.—*Hypnum rufescens* DICKS. *Pl. crypt. fasc.* III, p. 9, t. 8, f. 4 (1793). *HOFFM. Deutsch. fl.* ii, 59 (1795). *WITHER. Bot. arrang.* 3 ed. iii, 846 (1796). *BRID. Musc. rec.* II, P. II, 95, t. 3, f. 1 (1801), *Sp. musc.* II, 118 (1812). *SM. Fl. Brit.* 1317 (1804), *Eng. Bot.* t. 2296. P. BEAUV. *Prodr.* 69 (1805). *WEB. MOHR Bot. Tasch.* 342 (1807). *ROEHL. Deutsch. fl.* iii, 104 (1813). *HOOK. TAYL. Musc. Br.* 99 (1818). *GRAY Nat. arrang.* i, 757 (1821). *HOOK. Fl. Scot.* P. 2, 143 (1821). *RABENH. D. kr. fl.* II, s. III, 297 (1848). *C. MUELL. Synops.* ii, 384 (1851).

*Leskea rufescens* SCHWAEG. *Suppl. I, P. II*, 178, t. 86 (1816). *BRID. Mant.* 143 (1816), *Bry. univ.* ii, 284 (1827). *FUNCK Moost.* 55, t. 36 (1821). *GREV. Mem. Werner. Soc.* iii, 425. *DE NOT. Syllab.* 63 (1838). *WILS. Bryol. Brit.* 334 (1855).

*Isotheicum rufescens* Hueben. *Musc. germ.* 600 (1833).

*Orthothecium rufescens* BR. SCH. *Bry. Eur. fasc.* 48, p. 3, t. 1 (1851). *Synops.* 523 (1860), 2 ed. 631. *BERK. Handb.* 14 (1863). *MILDE Bry. Siles.* 29 (1869). *HOBK. Synops.* 2 ed. 19 (1884). *HUSN. Musc. Gall.* 31, t. 90 (1892). *DIX. JAMES. Stud. Handb.* 39 (1896). *LIMPR. in RABEN. D. kr. fl. Laubm.* iii, 16 (1896).

*Holmgrenia rufescens* LINDB. *Oefv. Vet. Ak. Foerh.* 1862, p. 605.

*Stereodon (Pylaisia) rufescens* MITT. *Journ. Linn. Soc.* viii, 40 (1864).

*Pylaisia rufescens* DE NOT. *Epilogo* 206 (1869).

*Orthothecium complanatum* KINDB. *Laubm. Schwed. & Norw.* 45 (1883).

Dioicous ; in soft rufescent glossy tufts, ascending ; stem repeatedly dichotomous, with few branches. Leaves erecto-patent and subsecund, not decurrent, elongate lanceolate, gradually acuminate, multiplicate,

nerveless, entire; cells narrow, linear, shorter and brown at base, longer at angles. Perich. bracts sheathing, ovate, acuminate in a flexuose subula; seta reddish; capsule erect, oblong, elongated, brown; lid conic, rostellate; teeth lanceolate-subulate, yellowish, processes as long, cilia rudimentary.

HAB.—Wet places in mountains, not rare. Fr. 9.

Near Inverary c. fr. (*Rev. C. Smith*). Finlarig burn c. fr. (*Wilson*)!! Ben Laoigh and near Tyndrum c. fr. (*Ewing* 1882)!! Ben Bulbin, Sligo. Malham (*Wood* 1868). Glen Dole c. fr. (*Fergusson*)!! Kilblane c. fr.

An elegant moss, conspicuous by the glossy purplish leaves, rare in fruit. Much more robust than the last species, with which it agrees closely in structure.

## 21. ISOPTERYGIUM *Mitt.*

Journ. Linn. Soc. xii, 21 (1869).

Stem procumbent, extended, the branches of unequal length, fasciculate. Leaves compressed, distichous, the three upper series (the central and intermediate) scarce evident, the three under wanting; nerves two, very short; cells narrow, smooth, the basal angular not differing, or sometimes enlarged and quadrate. Capsule inclined or horizontal, oblong, not sulcate, cilia united into one.—Der. *ἴσος* equal, and *πτέρυξ* a wing.

A genus of about 140 species, mostly of small size, and usually combined with *Plagiothecium*, from which it is difficult to distinguish it; the important distinction lies in the difference in the phyllotaxis.

### CLAVIS TO THE SPECIES.

Leaves with enlarged angular cells, plants robust.	<i>pratense</i> .
— without distinct angular cells, complanate.	
Cells very long and narrow.	
Flagelliferous. Leaves entire.	<i>Muelleri</i> .
Ramuliferous. — serrulate at point.	<i>elegans</i> .
— shorter and wider.	
Leaves complanate, short-pointed.	<i>depressum</i> .
— spreading, secund.	
Leaves entire, acuminate.	<i>pulchellum</i> .
— with long serrulate acumen.	<i>repens</i> .

## 1. ISOPTERYGIUM PRATENSE (*Koch*) *Lindb.*

Dioicous; suberect, with few irregular branches. Leaves complanate, the upper secund, ovato-lanceolate, nerveless. Capsule ovate, curved, cernuous; lid conical. (T. CXV, F.)

SYN.—*Hypnum pratense* KOCH in BRID. Bry. univ. ii, 769 mem. (1827). BR. SCH. Bry. Eur. fasc. 57—61, p. 43, t. 29 (1854). SCHIMP. Synops. 628 (1860), 2 ed. 759. WILS. Bry. Brit. 399, excl. var. (1855). BERK. Handb. Br. m. 125 (1863). MILDE Bry. Siles. 363 (1869). LESQ. JAMES Moss. N. Amer. 397 (1884). BOUL. Musc. Fr. 36 (1884). HUSN. Musc. gall. 406, t. 117 (1894). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 501 (1899).

*Hypnum amœnum* HOOK. in DRUMM. Musc. amer. No. 196 p.p.

*Hypnum curvifolium* var. *pratense* RABENH. D. kr. fl. II, s. 3, 273 (1848).

*Hypnum curvifolium* (non HEDW.) C. MUELL. Synops. ii, 292 p.p. (1851), Deutsch. Moose 423 (1853).

*Hypnum cupressiforme* var. *complanatum* HAMPE Veg. cel. Hercyn. exs. no. 96.

*Isopterygium pratense* LINDB. Musc. Scand. 39 (1879).

Dioicous and pseudautoicous; in lax soft pale green tufts. Stem rigid, prostrate or ascending, with few irregular complanate branches; paraphyllia few and small. Leaves crowded, secund and decurved at points, ovato-lanceolate, thin, entire or serrate at the long narrow point, slightly undulate when dry; nerves obsolete or very short; cells very narrow, pointed, at angles few, quadrate and rectangular; branch-leaves smaller falcato-secund. Perich. bracts imbricated, lanceolate with long recurved points, plicate; seta red; capsule cernuous, ochraceous, ovate, gibbous, arcuate when dry; lid convex-conic, annulus broad, in 3 series of cells; peristome yellow, processes cleft, cilia 2—3, papillose. Male infl. gemmiform, the bracts narrow lanceolate; sometimes attached by radicles to the stem or leaves of the female.

HAB.—Wet grassy places, not common, and sterile.

Sussex (*Borrer*). Hurstpierpoint (*Mitten*)!!

Much resembling *Ster. Lindbergii*, but the leaves have a different arrangement, and are more or less complanate, with the points curved down on one side; the cells at basal angles are much smaller.

## 2. ISOPTERYGIUM MUELLERI (*Schimp.*) Lindb.

Dioicous; in flat shining yellowish-green patches, the stems stoloniform and flagelliferous. Leaves distichous, lanceolate, gradually narrowed into a subulate point; nerves none or very short; cells very long and narrow. Capsule suberect, narrowly obovate tapering into a neck; lid conic rostellate. (T. CXVI, A.)

SYN.—*Plagiothecium Muellermanum* SCHIMP. Synops. 584 (1860), 2 ed. 698. MILDE Bry. Siles. 317 (1869). DE NOT. Epilogo 190 (1869). LESQ. JAMES MOSS N. Amer. 367 (1884). SULLIV. Icones musc. Suppl. 89, t. 66 (1874). HUSN. Musc. gall. 349, t. 100 (1893). DIXON in Journ. Bot. 1898, p. 241, t. 387. LIMPR. in RABENH. D. kr. fl. Laubm. iii, 283 (1897).

*Plagiothecium rostellatum* MOLENDO in Sched. 1861.

*Isopterygium Borreri* LINDB. Notiz. Saellsk. Fn. & Fl. fenn. xiii, 416 (1874).

*Plagiothecium Molendoi* LORENTZ in Sched.

*Isopterygium Muellerianum* LINDB. in Meddel. Soc. Fn. & Fl. fenn. 1887, p. 77.

Dioicous; in flat bright green shining tufts. Stem stoloniform, with ascending subpinnate complanate branches which often become flagelliform, long very slender small-leaved stolons, and with reddish radicles, the cortical cells very large, lax, and leptodermous. Leaves patent, distichous, from a narrow non-decurrent base elongato-lanceolate, gradually

attenuated into a long subulate point; margin flat, entire, and one of the wings often incurved; nerves obsolete or none; cells very long and narrow, subflexuose, not different at angles. Perichæatial bracts erect and appressed, inner lanceolate, narrowed into a faintly toothed piliform subula; seta longish red; capsule suberect or cernuous, oblong or cylindrical, with a long neck, arcuate when dry, not sulcate, pale brown; lid conical, rostellate; teeth narrow, yellowish, inner pale, the processes not perforated, cilia two.

HAB.—On earth, on damp shady mountain rocks. Fr. 10, very rare.

Ben Wyvis, Ross (*McKinlay* 1867). Ben Narnain, Argyll (*Murray* 1896). Lochay bridge, Craig Chaillach and Ben Heasgarnich, Perth (*Dixon* 1898). Ben Laoigh and Ben Doureann, Argyll (*Binslead* and *Dixon* 1898)!! Ben Clibrick and Ben Uidhe, Sutherland (*Salmon* and *Dixon* 1899). Ben Cruban, Killin (*Cocks* 1900)!!

This pretty moss varies considerably in size and also in the flagella, which are sometimes very numerous; it may always be recognised by the extremely long and narrow cells of the leaf. The fruit is extremely rare, and has not been found in Britain.

### 3. *ISOPTERYGIUM DEPRESSUM* (*Bruch*) *Mitt.*

Dioicous; in prostrate pinnately branched tufts. Leaves crowded, spreading, complanate ovate, entire or subserrulate, rather obtuse, with two short nerves or none. Capsule ovate-oblong, cernuous; lid rostrate. (T. CXVI, B.)

SYN.—*Hypnum depressum* BRUCH in *Flora* 1824, p. 763. RABENH. D. kr. fl. II, s. 3, 285 (1848). C. MUELL. Synops. ii, 258 (1851). WILS. Bry. Brit. 409, t. 59 (1855). BERK. Handb. br. m. 94 (1863). HOBK. Synop. 153 (1873). BOUL. Musc. Fr. 101 (1884).

*Hypnum confertum* f. *depressum* BRID. Bry. univ. ii, 767 (1827).

*Hypnum Wissgrillii* GAROVAG. Bry. Austr. 79 (1840).

*Rhynchostegium depressum* BR. SCH. Bry. Eur. fasc. 49—51, p. 8, t. 6 (1852). SCHIMP. Synops. 567 (1860), 2 ed. 682. HOBK. Synops. 2 ed. 207 (1884).

*Eurhynchium depressum* MILDE Bry. Siles. 299 (1869). HUSN. Musc. Gall. 343, t. 99 (1893).

*Isopterygium depressum* MITT. in *Journ. Linn. Soc.* xii, 497 (1869). LINDB. Musc. Scand. 39 (1879).

*Plagiothecium depressum* DIXON Stud. Handb. 431 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 280 (1897).

Dioicous; in soft depressed deep green glossy tufts, closely adhering to stones, and with short creeping flat branches often yellowish at points. Leaves crowded, bifarious, depressed, sometimes secund, the lateral divergent and subcomplicate, longish oval, with a short point or submuticous; margin flat, entire or obsoletely serrate; nerves two, short and indistinct or none; cells with thin walls narrowly rhomboid, a few quadrate and rectangular at angles. Perich. bracts gradually acuminate, erect, nerveless; seta short, reddish; capsule cernuous, longish-oval, subincurved, brownish,



contracted below mouth when dry; lid shorter than capsule, yellow, convex-conic, rostrate, annulus of two rows; teeth pale yellow, processes perforated, and with two slender cilia.

HAB.—On stones and tree-roots in woods on limestone, not rare. Fr. 12—2, rare.

Mill Dingle, Beaumaris c. fr. (*Wilson* 1828)!! Mowthorpe dale and Oxcair wood at Castle Howard station c. fr. (*Spruce* 1847)!! Todmorden and Gordale (*Nowell*). Arthog, Bar-mouth c. fr. (*Whitehead*)!! Whitbarrow, Westmoreland c. fr. (*J. M. Barnes* 1871)!! Dunton green, Kent (*Holmes*). Near Clifton c. fr. (*Palgrave*).

#### 4. *ISOPTERYGIUM ELEGANS* (*Hook.*) *Lindb.*

Dioicous; in prostrate shining green patches. Leaves complanate or oblique, ovato-lanceolate, acuminate with a few teeth at apex and two short nerves or none. Capsule ovate, cernuous; lid conic, shortly rostellate. (T. CXVI, C.)

SYN.—*Hypnum elegans* Hook. Musci exot. i, t. 9 (1818), et ii, App. 19 (1820). SCHWAEGL. Suppl. III, P. II, t. 282 a (1830). SPRUCE in Ann. Mag. Nat. Hist. 2 ser. iii, 276 (1849), et in Trans. Bot. Soc. Edinb. iii, 135 (1849). C. MUELL. Synops. ii, 260 (1851). WILS. Bry. Brit. 408, t. 59 (1855). SULLIV. Moss. Un. St. 80 (1856). HARTM. Skand. fl. 8 ed. 327 (1861). BERK. Handb. Br. Moss. 131 (1863). HOBK. Synops. 161 (1873). LESQ. JAMES Moss N. Amer. 366 (1884). BOUL. Musc. Fr. 89 (1884).

*Isothecium elegans* BRID. Bry. univ. ii, 356 (1827).

*Hypnum planifolium* BRID. op. c. p. 411.

*Leskea prostrata* TAYLOR MSS.

*Hypnum Borrerianum* SPRUCE MSS. (1846). C. MUELL. Synops. ii, 279 (1851).

*Plagiothecium elegans* SCHIMP. Coroll. 116, in obs. (1856), Synops. 2 ed. 697 (1876). JURATZ. Verh. z.—b. Verein. Wien, 1863, P. 501. SULLIV. Icones musc. Suppl. 86, t. 64 (1874). HUSN. Musc. Gall. 350, t. 101 (1893). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 285 (1897).

*Rhynchostegium elegans* LINDB. in Hedwigia 1863, p. 69, in Oefv. Vet. Akad. foerh. xx, 412 (1864), in Bot. Notis. 1865, p. 137—141, et in Notis. ur Saells. pro Fn. et Fl. fenn. foerh. 1867, p. 37.

*Plagiothecium Borrerianum* SPRUCE in Journ. Bot. 1880, p. 290. HOBK. Synops. 2 ed. 210 (1884). DIX. JAMES. Handb. Br. m. 432 (1896).

*Isopterygium elegans* LINDB. in Notis. saells. Fn. et Fl. fenn. xiii, 416 (1874).

*Isopterygium Borreri* LINDB. in Rev. bryol. 1882, p. 85.

Dioicous; growing in depressed shining patches, the stems prostrate with ascending branches, bright or yellowish green. Plants increasing by short caducous ramuli, which spring from axillar gemmæ. Leaves bifarious complanate, plane ovato-lanceolate, acuminate, sometimes slightly falcate; nerves very variable, obsolete or very short, or reaching  $\frac{1}{3}$  length of leaf; cells narrow, subflexuose, similar but shorter at angles. Perich. bracts erect, sheathing, inner lanceolate, ending in a long serrulate subula; seta purple; capsule suberect or cernuous, reddish-yellow, narrowly elliptic, with a short neck; lid conical-apiculate; teeth of peristome rufescent, papillose above; inner processes not perforated, cilia 2—3.



HAB.—Shady banks and rocks, not uncommon. Fr. 3—4.

Bantry c. fr. (*Miss Hutchins*). Ardingley rocks, Sussex c. fr. (*Mitten*)!! Sittingly rocks, Wakehurst c. fr. (*Hennings* 1855). Torc waterfall (*Taylor* 1843)!! Eridge rocks, Tunbridge Wells (*Mitten*). Woods at Castle Howard (*Spruce*)!! Hill Cliff and Orford, Warrington (*Wilson*). Todmorden (*Nowell*)!! Gibson's wood, Heptonstall (*Nowell* 1845)!! Trevaylor valley, Penzance c. fr. (*Marquand* 1880)!! Arthog, Barmouth c. fr. (*Whitehead* 1876)!! Wetherby, Yorks. (*Wesley*)!! Reisingill burn, Caithness (*Rev. D. Lillie* 1898)!! Bromley, Kent (*Cocks* 1899)!!

Var. *β. Schimperi* (*Jur. & Milde*) LIMPR. Krypt. fl. Schles. i, 83.

In dark green flat expanded tufts, with slender appressed branches. Leaves crowded, imbricated, in two ranks, broader and slightly falcate at points.

SYN.—*Plagiothecium denticulatum* var. *densum* SAUTER in RABEN. Bryoth. no. 390 (1861).

*Plagiothecium Schimperi* JURATZ. & MILDE in ditto no. 588 (1861), Verhand. z. b. Ges. Wien 1862, p. 968.

*Rhynchostegium elegans* var. *terrestre* LINDB. in Bot. Notis, 1865, p. 139, et in Not. ur Saells. Fn. et Fl. fenn. ix, 38 (1867).

*Plagiothecium Schimperi a. genuinum* WALTH. & MOL. Laubm. Oberfr. 182 (1868).

HAB.—Hard ground and tree-roots in subalpine woods.

Var. *γ. nanum* (*Jurat.*) WALTH. & MOL. op. c. 183.

Plants very small, in lax tufts; branches erect, fasciculate, flagelliform, slender and fragile. Leaves more pointed, erecto-patent, upper subsecund.

SYN.—*Plagiothecium nanum* JURATZ. in Bot. Zeit. 1864, Beil. p. 16. RABENH. in Hedwigia iv, p. 31 (1865).

HAB.—Among pebbles and under rocks.

This moss is indeed worthy of its name, for few can compare with it for its beautiful satiny lustre. Wilson's var. *collinum* appears to be a form with subsecund leaves. I have added the two varieties from Limpricht's Laubmoose, with the object of calling the attention of our collectors to them, as I have not seen any British specimens. This variable moss has proved a source of much confusion among botanists, as, following Spruce's lead, the European plant was regarded as different from the American; but by most recent bryologists they are again united. The position of the capsule is of little moment, as it varies with growth, and an erect one often becomes horizontal after the fall of the lid. The nerves also vary in size and direction, and may be obsolete or reach to the middle of the leaf, when it becomes Spruce's var. *longinerve*.

##### 5. ISOPTERYGIUM PULCHELLUM (*Dicks.*) Lindb.

Autoicous; in dense glossy tufts, branches erect, fastigiate. Leaves crowded, subpatent, secund, subfalcate, broadly lanceolate-acuminate, nerveless. Capsule suberect, cylindraceous; lid conical obtuse. (T. CXVI, D.)

SYN.—*Hypnum pulchellum* DICKS. Pl. crypt. fasc. II, 13, t. 5, fig. 6 a et b (1790). SMITH Fl. Brit. 1277 (1804). TURN. Musc. Hib. 136 (1804). BRID. Musc. rec. II, P. II, 101 (1801), Sp. Musc. II, 165 (1812), Mant. 169 (1819), Bry. univ. ii, 454 (1827). GRAY Nat. arrang. i, 756 (1821). Hook. Fl. Scot. P. 2, 143 (1821). HUEBEN. Musc. germ. 613 (1833). BERK. Handb. 128 (1863). BOUL. Musc. Fr. 90 (1884). LESQ. JAMES MOSS, N. Amer. 364 (1884).

*Leskea pulchella* HEDW. Sp. musc. 220, t. 55, fig. 7—12 (1801).

*Hypnum Sendtneri* (non SCHP.) C. MUELL. Synops. ii, 394 (1851).

*Plagiothecium pulchellum* BR. SCH. Bry. Eur. fasc. 48, p. 9, t. 4 (1851). SCHIMP. Synops. 578 (1860), 2 ed. 693. HOBK. Synops. 160 (1873). HUSN. Musc. gall. 353, t. 101 (1893). DIX. JAMES. Stud. Handb. 433 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 276 (1897).

*Hypnum rutilans* WILS. Bry. Brit. 404 in obs. (1855).

*Stereodon pulchellus* MITT. Journ. Linn. Soc. viii, 39 (1864).

*Plagiothecium nitidum* var. *suberectum* LINDB. in Bot. Not. 1865, p. 145, et in Not. ur Saells. Fn. Fl. fenn. foerh. 1867, p. 34. MILDE Bry. Siles. 316 (1869).

*Plagiothecium nitidulum* var. *β. pulchellum* LINDB. in Skand. fl. 10 ed. ii, 24 (1871).

*Isopterygium nitidum* var. *β. pulchellum* LINDB. Musc. scand. 39 (1879).

Autoicous; in small dense yellowish-green glossy tufts. Branches densely radiculose at base, ascending or erect, often slightly incurved and subcomplanate. Leaves crowded, secund, subfalcate, lanceolate-acuminate, fine-pointed, nerveless, concave; cells very narrow, at basal angles a few longish and rectangular. Perichætium radiculose, the bracts erect and sheathing, lanceolate, acute; seta reddish; capsule almost erect, oblongo-cylindric, rufescent; lid convex-conic, muticous; teeth confluent at base, pale yellow, inner on a high membrane; the processes perforated, cilia two. Male infl. gemmiform; bracts ovate, acute.

HAB.—Crevices of rocks in subalpine districts; not rare. Fr. 6—8.

Ben Lawers, Lochnagar and most of the Scotch mountains. Miller's dale (*Hunt*). Teesdale (*R. Barnes*)!! Frequent in the North Riding of Yorkshire.

Var. *β. nitidum* (*Wahlenb.*)

Plants more robust, prostrate; the leaves complanate, rarely secund, broader, longer, with more finely acuminate points. Capsule cernuous, ovate, reddish-brown, widely truncate when empty.

SYN.—*Leskea nitida* WAHLENB. MSS. WEB. MOHR Index musei pl. cr. (1803), Bot. Tasch. 344 (1807).

*Hypnum nitidulum* WAHLENB. Fl. Lapp 370 (1812), excl. syn.

*Hypnum pulchellum* SM. Eng. Bot. t. 2006. C. MUELL. Synops. ii, 277 (1851). WILS. Bry. Brit. 403, t. 25 (1855).

*Plagiothecium nitidulum* BR. SCH. Bry. Eur. fasc. 48, p. 10, t. 5 (1851). SCHIMP. Synops. 579, 2 ed. 694. HOBK. Synops. 2 ed. 209 (1884).

*Stereodon nitidulus* MITT. Journ. Linn. Soc. viii, 39, in obs. (1864).

*Plagiothecium nitidum* LINDB. in FRIES Bot. Not. 1865, p. 145, et Not. ur Saells. Fn. et Fl. fenn. foerh. ix, 34 (1867).

*Plagiothecium Arnoldi* MILDE Bry. Siles. 318 (1869).

*Isopterygium nitidum* LINDE. in Not. Saell. Fn. Fl. fenn. xiii, 416 (1874).

*Plagiothecium pulchellum* var. *β. nitidulum* LESQ. JAMES Moss. N. Amer. 364 (1884). DIX. JAMES. Stud. Handb. 433.

HAB.—In moister places on rotten trees and rocks in limestone districts.

Cronkley fell, Teesdale (*Spruce* 1843)! Rattand Clough, Todmorden (*Nowell* 1860)! Heseltine Ghyll, Yorks. (*Whitehead* 1861). Corrie of Boquhan burn, Stirling (*Kidston* 1896)!!

The two forms of this moss have been so confounded by the older botanists that it is hardly possible to separate them, and there is no doubt they were regarded as synonymous, while by some later authors they have been maintained as distinct species. In the typical plant the leaves are shorter, and quickly narrow into very fine points; in the variety they run out gradually into the acumen, and their cells also are longer and wider; in both the capsule becomes more horizontal when ripe. Dickson's figure of the magnified leaf clearly belongs to some other moss, having a single nerve to the apex, and is useful as a caution to beginners to secure a perfect plant for examination, as intermixture has often led to mistakes.

### 6. *ISOPTERYGIUM REPENS* (Poll.) Lindb.

Autoicous; stems procumbent, with few fasciculate-arcuate branches. Leaves laxly imbricated, secund, ovato-lanceolate, acuminate, serrulate, with two faint nerves at base. Capsule with a long neck, subcylindric, curved, cernuous; lid conic. (T. CXVII, A.)

SYN.—*Hypnum repens* POLLICH Hist. pl. palat. iii, 167, t. 1 (1777). LAM. Enc. meth. Bot. iii, 181 (1789). LAM. DE C. Fl. Franc. 3 ed. ii, 537 (1805). DE C. Synops. pl. gall. n. 1381 (1806), et Fl. Franc. 3 ed. v, 234 (1815). DUBY Bot. gall. ii, 562 (1830).

*Leskea Seligeri* BRID. Musc. rec. II, P. II, 47 (1801).

*Hypnum Silesiacum* SELIGER MS. P. BEAUV. Prodr. 70 (1805). WEB. MOHR Bot. Tasch. 343 (1807). ROEHL. Deutsch. fl. iii, 119 (1813). SCHWAG. Suppl. I, P. II, 287, t. 94 (1816). FUNCK Moost. 65, t. 49 (1821). HUEBEN. Musc. germ. 611 (1833). DE NOT. Syllab. 5 (1838), Epilogo 189 (1869). RABENH. D. kr. fl. II, s. 3, 273 (1848). WILS. Bry. Brit. 405, t. 59 (1855). BERK. Handb. 129 (1863). HOBK. Synops. 160 (1873). BOUL. Musc. Fr. 88 (1884).

*Hypnum (Stereodon) Silesiacum* BRID. Bry. univ. ii, 554 (1827).

*Hypnum Seligeri* (non BRID.) C. MUELL. Synops. ii, 259 (1851).

*Plagiothecium Silesiacum* BR. SCH. Bry. Eur. fasc. 48, p. 12, t. 6 (1851). SCHIMP. Synops. 581 (1860), 2 ed. 703. MILDE Bry. Siles. 317 (1869). HUSN. Musc. gall. 354, t. 102 (1893). DIX. JAMES. Stud. Handb. 434 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 289 (1897).

*Plagiothecium Seligeri* LINDB. in Bot. Not. 1865, p. 144.

*Plagiothecium repens* LINDB. in Not. Saells. Fn. Fl. fenn. iv, 36 (1867).

*Isopterygium (Dolichotheca) repens* LINDB. Musc. Scand. 39 (1879).

Autoicous; in lax procumbent pale green tufts, slightly glossy. Stems creeping, with incurved fasciculate branches, rooting at base. Leaves indistinctly complanate, secund, ascending, concave, lanceolate-acuminate, squarrosely patent or recurved, uppermost secund, longish-lanceolate, acuminate, serrulate in upper half, nerve forked, short or none; cells longish at base, at angles few, oval hyaline. Perich. bracts suddenly elongated into a subulate serrated recurved point; seta red; capsule smooth, cernuous, cylindric, curved, reddish-brown, wide at mouth; lid conic obtuse; peristome pale yellow, processes not perforated, cilia 2—3.

HAB.—On rotten trees and humus, rare. Fr. 4—5.

Abbeywood, Kent (*Mitten* 1843) !! Arncliffe wood, Eskdale (*Spruce* 1847). Joyden's wood, Kent (*House*).

22. *PLAGIOTHECIUM Schimp.*

Bry. Europ. fasc. 48 (1851).

Plants prostrate or ascending; sparingly and irregularly branched, stoloniferous. Leaves compressed or rarely equal on all sides, decurrent, inserted obliquely; nerves two, short or obsolete; cells pellucid, narrow, hexagono-rhomboid. Capsule smooth or more rarely plicate, erect or inclined, oval or oblong, subincurved, leptodermous; lid convex-conic, pointed or rostrate; peristome pale, the teeth densely articulated; cilia of endostome short, more or less perfect, sometimes none. Growing on moist woodland banks, tree-roots and in shaded clefts of rocks.—Der. *πλάγιος* oblique, and *θήκη* a capsule.

This fine genus of about 86 species is a natural one, and easily recognised, but some of the species come so near to each other that it is difficult to separate them.

## CLAVIS TO THE SPECIES.

Leaves spreading on all sides, squarrose.

— compressed, the lateral bifarious.

Leaves transversely undulate.

— not undulate.

Autoicous, very glossy.

Polygamous, robust, prim. utricle not separating from cell-wall, lid conical.

Dioicous, robust, prim. utricle contracted in a serpentine form, lid rostrate.

— very small and slender, capsule erect.

*striatellum*.*undulatum*.*denticulatum*.*succulentum*.*silvaticum*.  
*latebricola*.1. *PLAGIOTHECIUM STRIATELLUM (Brid.) Lindb.*

Autoicous; prostrate, densely tufted, the branches fasciculate. Leaves spreading, squarrose and secund, deltoid-ovate, acuminate, serrulate; nerves none or two short ones. Capsule oblong, suberect, with a long neck, striated when dry; lid conical. (T. CXVII, B.)

SYN.—*Hypnum Silesianum* (non SELIGER) SMITH Eng. Bot. t. 2016 (1808). HOOK. TAYL. Musc. Brit. 113 (1818). GRAY Nat. Arr. Br. pl. i, 765 (1821).

*Leskea striatella* BRID. Bry. univ. ii, 762 (1827).

*Hypnum Muehlenbeckii* BR. SCH. MSS. SPRUCE in Ann. Mag. nat. Hist. 2 ser. iii, 275, name only (1849). HARTM. Skand. Fl. 6 ed. p. 346 (1854). WILS. Bry. Brit. 404, t. 59 (1855). RABENH. D. kr. fl. II, s. 2, 274 (1848). BERK. Handb. 129 (1863). HOBK. Synops. 160 (1873). LESQ. JAMES MOSS. N. Amer. 370 (1884).

*Hypnum chrysophylloides* GUEMBEL in C. MUELL. Synops. ii, 436 (1851).

*Hypnum striatellum* C. MUELL. Synops. ii, 282 (1851). BOUL. Musc. Fr. 88 (1884).

*Plagiothecium Muehlenbeckii* BR. SCH. Bry. Eur. fasc. 48, p. 11, t. 6 (1851). SCHIMP. Synops. 580 (1860), 2 ed. 702. MILDE Bry. Siles. 320 (1869). DE NOT. Epilogo 190 (1869).

*Plagiothecium striatellum* LINDB. Bot. Notis. 1865, p. 144, et Notis. ur Saells. Fn. Fl. fenn. 1867, p. 32. HUSN. Musc. gall. 354, t. 101 (1894). DIX. JAMES. Stud. Handb. 434 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 273, fig. 395 (1897).



Autoicous ; in dense yellowish-green glossy tufts ; stems rigid, prostrate, ascending, with fasciculate erect branches, attenuated at points. Leaves crowded above, patent squarrose and secund, decurrent and subcordate at base, ovato-lanceolate, gradually subulate, concave, serrulate, faintly two-nerved at base ; cells at basal angles inflated, oval in 5—6 rows, upper very narrow. Perich. bracts erect, lanceolate, suddenly subulate, flexuose and serrated ; seta red ; capsule suberect, cylindric with a long neck, slightly curved, castaneous, striated when dry ; lid obtusely conical ; peristome pale yellow, inner whitish ; processes cleft between the articulations, cilia two.

HAB.—Alpine rocks, not rare. Fr. 6—7.

On most of the Breadalbane and Clova mountains. Glen Prosen (*Fergusson*)!! Ben Luyal (*Hooker* 1808). Llyn Ogwen, N. Wales (*Holmes*).

## 2. *PLAGIOTHECIUM LATEBRICOLA* (*Wils.*) *Br. Sch.*

Dioicous ; in small shining tufts, the stems slender, ascending, with few branches. Leaves ovato-lanceolate, subsecund, entire, with two faint nerves at base, margin slightly reflexed. Capsule erect, longish-oval, tapering at base ; lid conical, pointed. (T. CXVII, C.)

SYN.—*Leskea latebricola* WILS. MSS. et Bry. Brit. 329, t. 54 (1855).

*Plagiothecium latebricola* BR. SCH. Bry. Eur. fasc. 48, p. 6, t. 1 (1851). SCHIMP. Synops. 575 (1860), 2 ed. 690. LINDB. Not. ur Saells. Fn. Fl. fenn. foerh. ix, 32 (1867). MILDE Bry. Siles. 321 (1869). HOBK. Synops. 160 (1873). BOUL. Musc. Fr. 87 (1884). LESQ. JAMES Moss. N. Amer. 363 (1884). HUSN. Musc. gall. 349, t. 100 (1893). DIX. JAMES. Stud. Handb. 439 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 249 (1897).

*Philoscia latebricola* BERK. Handb. Br. m. 146 (1863).

*Hypnum scitulum* AUSTIN Bull. Torr. club, vi, 44.

Dioicous ; very small, in yellowish-green shining tufts, the stem fragile, ascending, the branches erect, radiculose at base. Leaves lax, bifarious, erecto-patent, ovato-lanceolate, with long acute points, rather concave, decurrent ; nerves obsolete ; margin entire, reflexed ; cells very narrow, at basal angles lax, rectangular and quadrate. Perich. bracts ovato-lanceolate, erect, with long points ; seta red ; capsule erect, longish-oval, yellowish-brown, wide-mouthed ; lid acutely conical ; teeth lineal, pale yellow ; processes narrow lineal, whitish ; cilia none. Male infl. small, gemmiform.

HAB.—Wet shady woods, on old fern stocks and decayed alders, not common. Fr. 1—2, rare.

Belton bog, Yarmouth c. fr. (*Palgrave* 1824). Paper-mill wood, Over, Cheshire c. fr. (*Wilson* 1828)!! Warrington (*Wilson*). Henfield, Sussex (*Borrer*). Todmorden (*Nowell*)!! Ide hill, Sevenoaks and Chipstead (*Holmes* 1887).

## 3. *PLAGIOTHECIUM UNDULATUM* (*L.*) *Br. Sch.*

Dioicous ; in whitish-green prostrate patches. Leaves complanate,



ovate, acute, transversely undulate, faintly two-nerved to  $\frac{1}{3}$  length. Capsule subcylindric, cernuous, longitudinally striate when dry; lid rostellate. (T. CXVI, E.)

SYN.—*Muscus terrestris repens*, *Lycopodii ferme facie* Doody, RAY Syn. stirp. Brit. 2 ed. app. 337 (1696).

*Hypnum repens crispum cauliculis compressis*, *Lycopodii in morem per terram sparsis* DILL. in RAY Synops. 3 ed. 88 (1724).

*Hypnum pennatum undulatum*, *Lycopodii instar sparsum* DILL. Hist. musc. 271, t. 36, f. 11 (1741) et Herb.

*Hypnum undulatum* L. Sp. plant. 1124 (1753). HUDS. Fl. Angl. 420 (1762). NECK. Meth. musc. 156 (1771). WITHER. Bot. arrang. ii, 682 (1776). LIGHTF. Fl. Scot. ii, 744 (1777). WEB. Spic. Fl. goett. 55 (1778). ROTH Tent. Fl. Germ. i, 465 (1788). HOFFM. Deutsch. fl. ii, 57 (1795). SWARTZ Musc. Suec. 63 (1799). HEDW. Sp. musc. 242 (1801). BRID. Musc. rec. II, P. II, 99 (1801), Sp. musc. II, 99 (1812), Mant. 156 (1819), Bry. univ. ii, 397 (1827). SMITH Fl. Brit. 1294 (1804), Eng. Bot. t. 1181. TURN. Musc. Hib. 154 (1804). P. BEAUV. Prodr. 72 (1805). WEB. MOHR Bot. Tasch. 348 (1807). WAHLEN. Fl. Lapp. 372 (1812). ROEHL. Deutsch. fl. iii, 100 (1813). SCHWAEGL. Suppl. I, P. II, 197 (1816), et III, P. II, t. 282 (1829). HOOK. TAYL. Musc. Brit. 92 (1818). FUNCK. Moost. 56, t. 37 (1821). GRAY Nat. arrang. i, 753 (1821). HOOK. Fl. Scot. P. 2, 141 (1821). HUEBEN. Musc. germ. 606 (1833). DE NOT. Syllab. 3 (1838). RABENH. D. kr. fl. II, s. 3, 284 (1848). C. MUELL. Synops. ii, 257 (1851). WILS. Bry. Brit. 405 (1855). HOBK. Synops. 162 (1873). BOULAY Musc. Fr. 83 (1884).

*Plagiothecium undulatum* BR. SCH. Bry. Eur. fasc. 48, p. 17, t. 13 (1851). SCHIMP. Synops. 586 (1860), 2 ed. 701. BERK. Handb. 132 (1863). DE NOT. Epilogo 186 (1869). MILDE Bry. Silen. 318 (1869). LESQ. JAMES MOSS. N. Amer. 369 (1884). HUSN. Musc. Gall. 353, t. 101 (1893). DIX. JAMES. Stud. Handb. 438 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 253 (1897).

*Stereodon undulatus* MITT. Journ. Linn. Soc. viii, 39 (1864).

Dioicous; in spreading lax whitish-green tufts. Stem creeping, prostrate, with few branches, both complanate. Leaves dense, imbricated, the lateral rows unsymmetric, ovate acute, narrow at base, transversely undulate, the anterior and posterior symmetric; nerves two, unequal,  $\frac{1}{3}$  length of leaf; cells narrow, hexagonal, at basal angles rectangular. Perich. bracts recurved, inner longly sheathing, narrowed into a long apiculus; seta purple; capsule cernuous, cylindraceous, curved, brownish-yellow, furrowed when dry, narrowed below mouth; lid large, rostrate. Teeth of peristome yellow, long, densely jointed; inner white, processes perforated, cilia 2—3.

HAB.—Moist banks in woods; not uncommon. Fr. 5—6.

#### 4. *PLAGIOTHECIUM DENTICULATUM* (L.) Br. Sch.

Autoicous; in flat soft bright green patches, shining. Stem prostrate, sparingly branched, the branches subfasciculate, complanate. Leaves obliquely ovate, acuminate, with two short nerves, margin reflexed at base. Capsule oblong, lid conical acute. (T. CXVII, D.)

SYN.—*Muscus pennatus capitulis Adianti* Bobart, RAY Synops. App. 236 (1690).

*Hypnum repens filicifolium non ramosum, pediculis et capitulis longioribus ad radicem egredientibus, foliis utrinque duplicatis* DILL. Cat. Giss. 218 (1718), et in RAY Synops. 3 ed. 88 (1724).

*Hypnum denticulatum pennatum, pinnulis duplicatis recurvis* DILL. Hist. musc. 266, t. 34, f. 5 (1741) et Herbar.

*Hypnum denticulatum* L. Sp. pl. 1122 (1753). HUDS. Fl. Angl. 420 (1762). NECK. Meth. musc. 154 (1771). WITHER. Bot. arrang. ii, 680 (1776). LIGHTF. Fl. Scot. ii, 741 (1777). WEB. Spic. fl. Goett. 44 (1778). HOFFM. Deutsch. fl. ii, 56 (1795). HEDW. Descr. iv, 81, t. 31 (1797). ROTH Tent. fl. Germ. iii, P. I, 264 (1800). BRID. Musc. rec. II, P. II, 52 (1801), Sp. musc. II, 91 (1812), Mant. 153 (1819), Bry. univ. ii, 551 (1827). SMITH Fl. Brit. 1288 (1804), Eng. Bot. t. 1260. TURN. Musc. Hib. 146 (1804). P. BEAUV. Prodr. 63 (1805). SCHULTZ Fl. Starg. 313 (1806). WEB. MOHR Bot. Tasch. 346 (1807). ROEHL. Deutsch. fl. iii, 99 (1813). WAHLENB. Fl. Lapp. 371 (1812), Fl. Carpat. 357 (1814). SCHWAB. Suppl. I, P. II, 187 (1816). HOOK. TAYL. Musc. Brit. 92 (1818). HOOK. Fl. Scot. P. 2, 141 (1821). FUNCK Moost. 56, t. 37 (1821). GRAY Nat. arrang. i, 753 (1821). HUEBEN. Musc. Germ. 609 (1833). DE NOT. Syllab. 7 (1838). RABENH. D. kr. fl. II, s. 3, 283 (1848). C. MUELL. Synops. ii, 251 (1851). WILS. Bry. Brit. 407 (1855). HOBK. Synops. 161 (1873). BOULAY Musc. Fr. 84 (1884).

*Plagiothecium denticulatum* BR. SCH. Bry. Eur. fasc. 48, p. 12, t. 8 (1851). SCHIMP. Synops. 582 (1860), 2 ed. 696. BERK. Handb. 130 (1863). MILDE Bry. Siles. 320 (1869). DE NOT. Epilogo (1869). LESQ. JAMES MOSS N. Amer. 367 (1884). HUSN. Musc. Gall. 351, t. 101 (1893). DIX. JAMES. Stud. Handb. 435 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 265 (1897).

*Fissidens denticulatus* LEYSS. Fl. hal. 264 (1783). WILLD. Prod. Fl. Berol. no. 922 (1787).

*Leskea denticulata* TIMM Prod. Fl. megap. no. 803 (1788).

*Pylaisæa radicans* LA PYL. Journ. Bot. 1813, p. 24, t. 33, f. 2.

*Leskea hamosa* AONGST. in Bot. Not. 1866, p. 102.

*Plagiothecium Gravetii* PIRÉ in Nouv. rech. bryol. fasc. 4 (1871).

Autoicous; in flat glossy deep green tufts. Stem prostrate, stoloniferous, the branches erect, complanate. Leaves at base very small, lanceolate, the median large ovate-oblong, pointed, decurrent, asymmetric, the lower half inflexed; nerve forked, very slender,  $\frac{1}{4}$ — $\frac{1}{3}$  length of leaf; cells pointed, 12—14 times longer than wide, often with a serpentine primordial utricle, quadrate and rectangular at angles. Inflorescence at base. Perich. bracts sheathing, acutely pointed, with a long nerve; seta red; capsule cernuous or horizontal, cylindraceous, incurved, yellowish-brown, often striate when old, the lid conic apiculate. Peristome teeth yellow, papillose at point, inner paler, the processes lacunose in the keel, cilia 2—3, often imperfect.

HAB.—Damp woods and rotten trunks of trees; common. Fr. 5—7.

Var. *β. Aptychus* Spruce.

Leaves ovato-lanceolate, apiculate, decurved and subsecund; nerves short, margin scarcely reflexed below, cells very narrow; capsule shorter oblongo-cylindric, not striate; neck not distinct, lid short and conical.

*Plagiothecium denticulatum* subsp. *Aptychus* SPRUCE in Journ. Bot. 1880, p. 355.

*Plagiothecium nitellum* WILS. MSS.

HAB.—Wood at Coneysthorpe banks and in Teesdale, Yorks. (*Spruce* 1880)!!  
Pepperstock, Beds. (*Saunders*). Frodsham, Cheshire (*Wilson* 1868).

Var. *γ. Donii* (*Smith*) *Lindb.*

In pale green shining tufts; branches short, crowded, fasciculate; leaves oval, rounded or obtuse at point and with laxer cells.

SYN.—*Hypnum Donianum* SMITH Eng. Bot. t. 1446.

*Hypnum denticulatum γ. obtusifolium* TURN. Musc. Hib. 146, t. 12, f. 2 (1804).

*Hypnum obtusatum* WAHLENB. Fl. Lapp. 371 (1812).

*Hypnum obtusifolium* BRID. Sp. musc. II, 93 (1812).

*Stereodon Donianus* MITT. Journ. Linn. Soc. i, 104 (1859).

HAB.—Ben Lawers, Craig Chaillead, &c. Carned Llewellyn (*Wilson* 1854).  
Helvellyn. Albourne, Sussex (*Mitten*). Sheeps Tor and Mis Tor, Devon  
(*Holmes*).

Var. *δ. majus* *Boulay*.

Robust, 2—3 in. high. Leaves large, acute, shrinking when dry; nerve long and well defined; cells large and wide. Capsule large, narrowly cylindric, arcuate, striate; lid rostellate.

DIXON & JAMES. Stud. Handb. 436.

HAB.—Damp mountain woods. Canisp, Sutherland (*Dixon* 1899)!!

This moss is extremely variable, and is often confounded with the next species, so much do the specimens differ in size, habit and colour, according to the shade or moisture of the locality. The smooth or striate capsule, on which *Spruce* laid so much weight, does not seem to be a matter of great importance, as the striation appears to depend chiefly on the shrinking of the capsule-wall after sporosis or drying.

##### 5. *PLAGIOTHECIUM SILVATICUM* (*Huds.*) *Br. Sch.*

Dioicous; stem decumbent, sparingly branched, in looser dingy green tufts with faint gloss. Leaves rather distant, narrowly ovate, the lateral unsymmetric; nerve forked, reaching middle of leaf. Capsule cylindric, slightly curved; lid conic, rostrate. (T. CXVIII, A.)

SYN.—*Hypnum repens filicifolium ramosum, pediculis et capitulis longioribus e foliorum alis egredientibus, foliolis utrinque simplicibus* DILL. in RAY Synops. 3 ed. 88, n. 44 (1724).

*Hypnum denticulatum pennatum, pinnulis simplicibus rectoribus* DILL. Hist. musc. 267, t. 34, f. 6 (1741) et Herbar.

*Hypnum silvaticum* HUDS. Fl. Angl. 419 (1762). L. Mant. pl. ii, 310 (1767). WITHER. Bot. arrang. ii, 681 (1776). ROTH Tent. Fl. Germ. i, 465 (1788). HOFFM. Deutsch. fl. ii, 56 (1795). BRID. Musc. rec. II, P. II, 53, t. 1, f. 5 (1801). Sp. musc. II, 92 (1812). Mant. 153 (1819). Bry. univ. ii, 550 (1827). SWARTZ Musc. Suec. 52 (1799). P. BEAUV. Prodr. 71 (1805). WEB. MOHR Bot. Tasch. 345 (1807). SCHWAEG. Suppl. I, P. II, 182, t. 87 (1816). HUEBEN. Musc. Germ. 608 (1833). DE NOT. Syllab. 6 (1838). RABENH. D. kr. fl. II, s. 3, 283 (1848). WILS. Bry. Brit. 406, t. 59 (1855). HOBK. Synops. 162 (1873).

*Hypnum denticulatum* var. *silvaticum* TURN. Musc. Hib. 146, t. 13 (1804). SMITH Fl. Brit. 1289 (1804). ROEHL. Deutsch. fl. iii, 99 (1813). BOUL. Musc. Fr. 85 (1884).

*Plagiothecium silvaticum* BR. SCH. Bry. Eur. fasc. 48, p. 14, t. 11 (1851). SCHIMP. Synops. 585 (1860), 2 ed. 700. BERK. Handb. 131 (1863). MILDE Bry. Siles. 319 (1869). DE NOT. Epilogo 187 (1869). LESQ. JAMES MOSS. N. Amer. 368 (1884). HUSN. Musc. Gall. 351, t. 101 (1893). DIX. JAMES. Stud. Handb. 437 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 258 (1897).

Dioicous; stronger than *denticulatum*, in loose dingy green tufts, scarcely glossy, stoloniferous; branches suberect, complanate, dense-leaved at base. Leaves longer, ovate and ovato-lanceolate, the lateral asymmetric, short-pointed, the margin slightly reflexed at base; nerve strong, forked, reaching  $\frac{1}{4}$ — $\frac{1}{2}$  length; cells laxer, the primordial utricle serpentine-ly contracted, at basal angles rectangular. Perich. bracts erect, inner sheathing, with a short lanceolate point; seta red; capsule cernuous or horizontal, cylindric, slightly curved, reddish-brown, striate; lid conic, with a long beak; peristome yellow, basal membrane of endostome  $\frac{1}{3}$  its length, cilia 2—3. Male infl. ovate, scattered along the stem and branches.

HAB.—Damp woods, among rocks and tree-roots; not uncommon. Fr. 9.

Var. *β. Roesii* (Hampe) Lindb.

Smaller than the type, brighter green and more glossy. Leaves less complanate, concave, with very short nerves and laxer cells. Capsule erect oval; lid conic, obtusely acuminate.

SYN.—*Hypnum Roesii* HAMPE MSS.

*Plagiothecium Roeseanum* SCHIMP. Bry. Eur. l.c. t. 10, Synops. 584, 2 ed. 699. LIMPR. Laubm. iii, 261.

*Plagiothecium denticulatum* var. *myurum* Bry. Eur. l.c. t. 8, f. e 1-7.

*Plagiothecium Sullivantiae* SCHIMP. Bry. Eur. l.c. p. 16 in obs.

*Hypnum Sullivantiae* SULL. MOSS. U.S. p. 80 (1856), et Icones musc. 207, t. 126 (1864).

*Pl. silvaticum* var. *cavifolium* JUR. in RABENH. Bryoth. no. 765. Var. *γ. Roesii* LINDB. in HARTM. Skand. fl. 9 ed. (1864) et in Bot. Not. 1865, p. 143.

*Pl. silvaticum* var. *myurum* MOLEND. Alga. Alp. 98 (1865).

HAB.—Sandy soil in alpine woods; rare. Fr. 8.

Kirkstone Pass, Westmoreland (Stabler 1876)!

Var. *γ. orthocladum* (Br. Sch.)

Plants shorter; branches crowded, erect, fastigiate. Leaves crowded and scarcely complanate, wider and suddenly ending in a short apiculus.

SYN.—*Plagiothecium orthocladum* BR. SCH. Bry. Eur. fasc. 48, p. 15, t. 10.

*Plagiothecium silvaticum* var. *orthocladum* SCHIMP. Coroll. 115, Synops. 585. LIMPR. Laubm. iii, 262.

HAB.—Among grass and stones near the sea at Dunnet, Caithness (Rev. D. Lillie 1901).



6. **PLAGIOTHECIUM SUCCULENTUM** (Wils.) Lindb.

Polygamous ; robust, deep yellowish-green, complanate. Leaves lax divergent, long, ovate acuminate ; nerve forked, short ; cells chlorophyllose, the primordial utricle not apparent. Capsule cylindric. (T. CXVIII, B.)

SYN.—*Hypnum succulentum* WILS. MSS.

*Hypnum denticulatum* var. *γ. succulentum* WILS. Bry. Brit. 407 (1855).

*Plagiothecium succulentum* LINDB. in Bot. Not. 1865, p. 143, et in Notis. saellsk. Fn. et Fl. fenn. 29 (1867). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 263 (1897).

*Plagiothecium sylvaticum* var. *succulentum* HUSN. Musc. Gall. 352 (1893). DIX. JAMES. Stud. Handb. 437 (1896).

Polygamous, synoicous + male, or synoicous + female ; the bracts broadly ovate, with acute recurved points. Tufts yellowish-green, glossy ; stem creeping, stoloniferous, with erect lax-leaved branches. Leaves spreading horizontally, slightly asymmetric, longish ovate, acutely pointed, margin narrowly recurved in lower half ; cells long, acutely pointed, the primordial utricle not distinct, chlorophyllose. Perich. bracts erect, sheathing, faintly nerved ; seta flexuose ; capsule cernuous, cylindric, castaneous ; lid conical, bluntly rostellate ; peristome pale yellow, endostome whitish, the processes slit between the joints.

HAB.—Moist stony ground in woods ; rare.

Winwick stone quarry, Warrington (Wilson). Todmorden (Nowell). Near Aber, N. Wales (Dixon 1892)!! Near Over, Cheshire.

23. **ACROCLADIUM** Mitt.

Journ. Linn. Soc. xii, 531 (1869).

Stem ascending, subpinnate, the bark of three layers of small purple cells, with a cuticular layer of large hyaline cells. Leaves equal on all sides or compressed and distichous, glossy, with two short nerves ; the cells narrow, and at basal angles large, hyaline, and inflated. Capsule hypnoid. Growing on the ground in wet places.—Der. *ἄκρος* the top, and *κλάδος* a branch.

A small genus of half a dozen species, of which the present is the only one found in Europe. The structure of the stem is peculiar, and gives the chief character to the genus, the section resembling that of a *Sphagnum*, e.g. *S. subsecundum*.

**ACROCLADIUM CUSPIDATUM** (L.) Lindb.

Dioicous ; stem suberect, pinnate, and with the branches cuspidate by the closely imbricated leaves. Leaves ovate, obtuse ; perich. bracts striated. Capsule curved, cernuous ; lid conical. (T. CXVIII, C.)



SYN.—*Muscus ramosus palustris major, foliis membranaceis acutis* RAY Synops. stirp. Brit. 2 ed. 39 (1696).

*Hypnum repens palustre foliis triangularibus per caules expansis extremilatibus convolutis et acuminatis* DILL. Cat. Giss. 219 (1718).

*Hypnum palustre, extremilatibus cuspidatis et pungentibus* DILL. Hist. musc. 300, t. 39, f. 34 (1741) et Herbar.

*Hypnum cuspidatum* L. Sp. pl. 1127 (1753). HUDS. Fl. Angl. 428 (1762). NECK. Meth. musc. 163 (1771). WITHER. Bot. arrang. ii, 688 (1776). LIGHTF. Fl. Scot. ii, 761 (1777). HOFFM. Deutsch. Fl. ii, 58 (1795). ROTH Fl. Germ. i, 471 (1788). SIBTH. Fl. Oxon. 300 (1794). HEDW. Sp. musc. 354 (1801). BRID. Musc. rec. II, P. II, 86 (1801), Sp. musc. II, 120 (1812), Mant. 159 (1819), Bry. univ. ii, 562 (1827). SM. Fl. Brit. 1317 (1804), Eng. Bot. t. 2407. TURN. Musc. Hib. 117 (1804). SCHULTZ Fl. Starg. 317 (1806). WEB. MOHR Bot. Tasch. 339 (1807). WAHLENB. Fl. Lapp. 381 (1812), Fl. Carpat. 360 (1814). ROEHL. Deutsch. Fl. iii, 105 (1813). SCHWAEG. Suppl. I, P. II, 208 (1816). HOOK. TAYL. Musc. Brit. 100 (1818). HOOK. Fl. Scot. P. 2, 146 (1821). FUNCK Moost. 59, t. 41 (1821). GRAY Nat. arr. Br. pl. i, 762 (1821). HUEBEN. Musc. germ. 653 (1833). DE NOT. Syllab. 44 (1838), Epilogo 169. RABENH. D. kr. fl. ii, s. 3, 289 (1848). WILS. Bry. Brit. 375 (1855). C. MUELL. Synops. ii, 383 (1851). BR. SCH. Bry. Eur. fasc. 57—61, p. 51, t. 36 (1854). SCHIMP. Synops. 644 (1860), 2 ed. 789. BERK. Handb. Br. m. 108, t. 8 (1863). MILDE Bry. Siles. 370 (1869). HOBK. Synops. 179 (1873). BOUL. Musc. Fr. 17 (1884). LESQ. JAMES Moss. N. Amer. 403 (1884). HUSN. Musc. Gall. 418, t. 101 (1894). DIX. JAMES. Stud. Handb. 490 (1896).

*Stereodon cuspidatus* MITT. Journ. Linn. Soc. viii, 42 (1865).

*Acrocladium cuspidatum* LINDB. Musc. scand. 39 (1879). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 567, fig. 434 (1899).

*Calliergon cuspidatum* KINDB. Eur. & N. Amer. Bryin. 81 (1897).

Dioicous; in lax yellow-green glossy tufts; stem suberect, rigid, pinnate, with two rows of unequal branches, all pointed by the convolute leaves, and in section consisting of lax cells with a bark of three rows of minute purple incrassate cells, and an outer cuticle of one layer of large hyaline cells. Stem-leaves crowded, broadly ovate, obtuse, concave; margin entire, incurved above; nerves two, very short or none; cells narrow, flexuose, at the impressed basal angles lax, hyaline, oval and angular. Perich. bracts erect, multiplicate; seta purple; capsule horizontal, cylindraceous, gibbous, rufescent above, greenish-yellow beneath; lid conical, pointed; annulus of 3—4 rows of cells, peristome yellow, cilia 2—3.

HAB.—Marshy ground; common. Fr. 5—6.

Var. *β. pungens* Schimp. Synops. 644.

Plants more slender and fragile, pale olivaceous; stem-leaves less decurrent, imbricated; branches subulate, with convolute leaves.

HAB.—Watery places. Jackdaw crag, Tadcaster (*Wesley* 1879)!! Walton near Preston, Lancs. (*Beesley* 1901)!!

Var. *γ. fluitans* Klinggr. Leb. und Laubm. West- und Ostpr. 294.

Stems very long and floating, dark green, flaccid; leaves distant, spreading as if distichous. Resembling *Ambl. Kneiffii*.

HAB.—Floating in pools. Peat hole, Brookhouse bog near Manchester (*Holt* 1893).

Var. *δ. cæspitosum* Whitehead MSS. DIXON Stud. Handb. 491.

Stems short, densely tufted ; leaves all narrow, somewhat tapering and pointed, erecto-patent, not convolute at points of stems.

HAB.—Monk's dale, Derby (*Barker* 1888).

## 24. ENTODON *C. Muell.*

Bot. Zeit. 1844, p. 740.

Stem creeping, with ascending branches or procumbent and pinnate. Leaves crowded, complanate, ovate-oblong, smooth and glossy, equal or a little diverse ; nerves two, very short or none ; cells narrow, linear, at angles a group of small and quadrate ones. Capsule regular cylindraceous, erect ; calyptra dimidiate ; lid conical or rostellate ; peristome inserted below orifice ; teeth 16, narrow, lanceolate ; processes dark-coloured, without cilia.—Der. ἐντός within, ὀδούς a tooth.

Above 150 species are referred to this genus, of which *Cylindrothecium* forms a section, having distichous branches, and the processes of endostome narrow.

## ENTODON ORTHOCARPUS (*La Pyl.*) *Lindb.*

Dioicous ; resembling *Hylocomium parietinum* ; pinnate, growing in lax glossy brownish-yellow tufts, the branches crowded and divergent ; leaves ovate, obtuse, entire, nerveless. Capsule cylindric, erect ; lid conical. (T. CXVIII, D.)

SYN.—*Hypnum Schreberi* γ. *orthocarpum* BRID. Bry. univ. ii, 422 (1827).

*Hypnum orthocarpum* LA PYL. MSS. in BRID. op. cit. p. 422.

*Hypnum concinnum* DE NOT. Mantis. no. 18 (1835).

*Isothecium insidiosum* Mont. in Ann. des Sci. nat. xx, 352, t. 15, f. 1 (1843).

*Entodon Montagnei* C. MUELL. in Linnæa xviii, 708 (1844).

*Entodon insidiosus* SPRUCE MUSC. Pyren. no. 72, et in Ann. Mag. nat. Hist. iii, 149 (1849).

*Neckera orthocarpa* C. MUELL. Synops. ii, 69 (1850).

*Cylindrothecium Montagnei* BR. SCH. Bry. Eur. fasc. 46—47, p. 6, t. 2 (1851). WILS. Bry. Brit. 327, t. 54 (1855). BERK. Handb. 141 (1863). DE NOT. Epilogo 213 (1869). HOBK. Synops. 142 (1873).

*Hypnum Montagnei* HARTM. Skand. fl. 7 ed. (1858).

*Cylindrothecium concinnum* SCHIMP. Synops. 515 (1860), 2 ed. 626. MILDE Bry. Siles. 290 (1869). HOBK. Synops. 2 ed. 195 (1884). BOULAY MUSC. Fr. 151 (1884). LESQ. JAMES Moss. N. Amer. 313 (1884). HUSN. Musc. gall. 314, t. 89 (1892). DIX. JAMES. Stud. Handb. 389 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 31 (1896).

*Hypnum dolosum* DE NOT. Epilogo 170 (1869).

*Entodon orthocarpus* LINDB. Musc. scand. 39 (1879).

Diocious; much resembling *Hylocomium parietinum*, in lax glossy yellowish-green or fulvescent tufts, brown at base. Stems 2—3 in., pinnate, with numerous short recurved acute branches. Stem-leaves erecto-patent, elliptic, obtuse or apiculate, nerveless or with two short striæ, margin plane, recurved at base; cells lineal, rectangular at base, numerous, quadrate and oval at angles. Perich. bracts squarrosely spreading from the middle; capsule erect, long cylindric, castaneous; lid conical, apiculate, yellow; teeth purple; processes of endostome lineal, perforated in the keel.

HAB.—On the ground in limestone districts; not common, sterile.

Near summit of Ben Lawers (*Wilson* 1836)!! Woolsonbury hill, Sussex (*Mitten*). Welburn, Yorks. (*Spruce*)!! Otford, Kent (*Howse*). Wrotham and near Maidstone (*Holmes*). Malham (*Hunt*). Near Steyning (*Davies*). Clova (*Fergusson*).

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- TAB. LXXXV. *A. Thuidium tamariscifolium*. B. *T. delicatulum* (Wales, *Holt*). C. *T. recognitum* (Helks wood, *Nowell*). D. *T. abietinum* (Hayle sands, *Curnow*).
- TAB. LXXXVI. A. *T. hystricosum* (Morant's Court hill, *Holmes*). B. *T. Blandowii* (Knutsford, *Wilson*). C. *Leskea catenulata* (Ingleborough, *Nowell*). D. *L. nervosa* (Ben Lawers, *Stirton*). E. *L. polycarpa* (Mickleham, *Braithwaite*).
- TAB. LXXXVII. A. *Anomodon viticulosus* (Todmorden, *Nowell*). B. *A. attenuatus* (Den of Airlie, *Fergusson*). C. *A. longifolius* (Wells, *Binstead*). D. *Amblystegium filicinum* (Eskdale, *Braithwaite*).
- TAB. LXXXVIII. A. *Amb. fallax* (Stroud, *G. Holmes*). B. *A. curvicaule* (Ben Lawers, *Dixon*). C. *A. irriguum* (Bangor, *Wilson*). D. *A. fluviatile* (Bangor, *Wilson*). E. *A. radicale* (Milnthorpe, *Barnes*). F. *A. varium* (Shere, *Capron*).
- TAB. LXXXIX. A. *A. serpens* (Croydon, *Braithwaite*). B. *A. confervoides* (Dovedale, *Dr. Fraser*). C. *A. Sprucei* (Gainford, *R. Barnes*). D. *A. riparium* (Leyton, *Braithwaite*). E. *A. Kochii* (*Mitten*).
- TAB. XC. A. *A. elodes* (Southport, *Wilson*). B. *A. chrysophyllum* (Trafford, *Hunt*). C. *A. protensum* (York, *Spruce*). D. *A. stellatum* (Todmorden, *Nowell*). E. *A. polygamum* (Southport, *Hunt*).
- TAB. XCI. A. *A. Juratzka* (Poynings, *Mitten*). B. *A. glaucum* (Eskdale, *Braithwaite*). C. *A. decipiens* (Clova, *Fergusson*). D. *A. falcatum* (Sutton Park, *Bagnall*).
- TAB. XCII. *A. Sendtneri* (Southport, *Hunt*).
- TAB. XCIII. A. *A. intermedium* (Southport, *Hunt*). B. *A. revolvens* (Todmorden, *Nowell*). C. *A. lycopodioides* (Southport, *Wilson*). D. *A. vernicosum* (Wybunbury bog, *Wilson*).
- TAB. XCIV. A. *A. aduncum* (Kenmore, *R. B.*). B. *A. exannulatum* (Hale moss, *Wilson*). C. *A. fluitans* (Southport, *Hunt*). D. *A. Kneiffii* (Southport, *Hunt*).
- TAB. XCV. A. *A. Smithii* (Ben Lawers, *Ewing*). B. *A. molle* (Ben McDhui, *Hunt*). C. *A. dilatatum* (Loch Brandy, *Fergusson*). D. *A. ochraceum* (Todmorden, *Nowell*). E. *A. palustre* (Eskdale, *R. B.*). F. *A. eugyrium* (Aber, *Wilson*).
- TAB. XCVI. A. *A. giganteum* (Hale moss, *Wilson*). B. *A. cordifolium* (Hale moss, *Wilson*). C. *A. sarmentosum* (Glen Prosen, *Fergusson*).
- TAB. XCVII. A. *A. stramineum* (Todmorden, *Nowell*). B. *A. trifarium* (Ben Challum, *Ewing*). C. *A. scorpioides* (Malham, *Nowell*). D. *Hypnum Hochstetteri* (Barra, *Braithwaite*).
- TAB. XCVIII. A. *H. purum* (Whitby, *R. B.*). B. *H. illecebrum* (Penzance, *Curnow*). C. *H. caespitosum* (Frodsham, *Wilson*). D. *H. striatum* (Croydon, *R. B.*). E. *H. meridionale* (Wells, *Binstead*).
- TAB. XCIX. A. *H. striatulum* (Arundel, *Davies*). B. *H. strigosum*. C. *H. circinatum* (Plymouth, *Holmes*). D. *H. pallidirostre* (Shere, *Capron*). E. *H. praelongum* (Sevenoaks, *R. B.*).
- TAB. C. A. *H. Swartzii* (Wells, *Binstead*). B. *H. Schleicheri* (Shere, *Capron*). C. *H. speciosum* (Penzance, *Curnow*). D. *H. hians* (Lindfield, *Davies*).

- TAB. CI. *A. H. crassinerve* (Lewes, Nicholson). *B. H. Teesdalei* (Rigg mill, R. B.). *C. H. curvisetum* (Wakehurst, Davies). *D. H. litoreum* (Lewes, Nicholson). *E. H. Algiranium* (Dovedale, Holmes).
- TAB. CII. *A. H. piliferum* (Castle Howard, Spruce). *B. H. cirrososum* (Ben Lawers, Hunt). *C. H. rusciforme*.
- TAB. CIII. *A. H. murale* (Malton, R. B.). *B. H. confertum* (Dorking, R. B.). *C. H. megapolitanum* (Southport, Hunt). *D. H. rotundifolium* (Wells, Binstead). *E. H. velutinum*.
- TAB. CIV. *A. H. pseudoplumosum* (Capel Curig, R. B.). *B. H. viride* (Southport, Hunt). *C. H. albicans* (Southport, Hunt). *D. H. reflexum* (Ben Lawers, Wilson). *E. H. Starkei* (Ben Lawers, B. White).
- TAB. CV. *A. H. glaciale* (Ben Lawers, Wilson). *B. H. campestre* (Wakehurst, Davies). *C. H. curtum* (Finland, Lindberg). *D. H. rutabulum*.
- TAB. CVI. *A. H. rivulare* (Tadmorden, Nowell). *B. H. plumosum* (Castle Howard, Spruce). *C. H. glareosum* (Ingleton, Nowell). *D. H. trichoides* (Terrington, Spruce).
- TAB. CVII. *A. H. lutescens* (Sevenoaks, R. B.). *B. H. sericeum* (Mucross, R. B.). *C. Lesquereuxia plicata* (Ben Lawers, Hunt). *D. L. filamentosa* (Ben Lawers). *E. L. atrovirens* (Ben Lawers, Monington). *F. L. saxicola* (Ben Lawers, West).
- TAB. CVIII. *A. Isoetium myosuroides* (Mucross, R. B.). *B. I. viviparum* (Croydon, R. B.). *C. Pterogon. ornithopodioides* (Rydal, Wood). *D. Pterigyn. filiforme* (Buttermere, Baker). *E. Helicod. pulvinatum* (York, Webster). *F. Habrodon perpusillus* (Killin, R. B.).
- TAB. CIX. *A. Myurella tenerima* (Craig Chailleach, Dixon). *B. M. julacea* (Ingleborough, Nowell). *C. Heterocl. squarrosulum* (Ben Lawers, Hunt). *D. H. heteropterum* (Dolgelly, Whitehead). *E. Hylocomium brevirostre* (Killarney, R. B.).
- TAB. CX. *A. Hyl. umbratum* (Glen Dole, Fergusson). *B. H. Pyrenaicum* (Ben Lawers, Hunt). *C. H. proliferum* (St. Andrews, R. B.). *D. H. parietinum* (Tadmorden, Nowell).
- TAB. CXI. *A. H. triquetrum* (Whitby, R. B.). *B. H. squarrosulum* (Whitby, R. B.). *C. H. loreum* (Tadmorden, Nowell). *D. H. rugosum* (Dovedale, R. B.).
- TAB. CXII. *A. Campylium Halleri* (Ben Lawers, Hunt). *B. C. hispidulum*  $\beta$  (Castle Howard). *C. Ctenidium molluscum* (Killarney, R. B.). *D. C. procerrimum* (Ben Lawers, Stirton). *E. Hyocomium flagellare* (Lydford, Holmes). *F. Ptilium Crista Castrensis* (Perthshire).
- TAB. CXIII. *A. Semat. demissum* (Tore falls, Moore). *B. S. micans* (Killarney, Hunt). *C. Stereodon Lindbergii* (Arncliffe, R. B.). *D. S. imponens* (Reigate heath, R. B.). *E. S. cupressiformis*.
- TAB. CXIV. *A. S. resupinatus* (Preston, Beesley). *B. S. revolutus* (Ben Lawers, Jameson). *C. S. Canariensis* (Killarney, Hunt). *D. S. circinalis* (Killarney, Binstead). *E. S. callichrous* (Tyn-y-groes, Holt). *F. S. hamulosus* (Craig Chailleach, Hunt).
- TAB. CXV. *A. S. Bambergeri* (Ben Lawers, Dr. Frazer). *B. S. incurvatus* (Ingleton, Nowell). *C. S. polyanthos* (Mucross, R. B.). *D. S. subrufus* (Buxton, Hunt). *E. S. rufescens* (Tyndrum, Ewing). *F. Isopt. pratense*.
- TAB. CXVI. *A. Is. Muelleri* (Ben Dourean, Binstead). *B. Is. depressum* (Castle Howard, R. B.). *C. Is. elegans* (Ardingley, Davies). *D. Is. pulchellum* (Ben Lawers, R. B.). *E. Plag. undulatum* (Whitby, R. B.).
- TAB. CXVII. *A. Is. repens* (Abbey wood, Holmes). *B. Plag. striatellum* (Clova, Fergusson). *C. P. latebricola* (Over, Wilson). *D. P. denticulatum*.
- TAB. CXVIII. *A. P. silvaticum*. *B. P. succulentum* (Aber, Dixon). *C. Acrocladium cuspidatum* (Greenhithe, R. B.). *D. Entodon orthocarpus* (Ben Lawers, R. B.).

a. Fertile pl. b. Male pl. c. Sterile pl. 1. Stem leaf. 1 a. Apex. 1 b. Base. 1 x. Section.  
1 r. Branch leaf. 1 rr. Branchlet leaf. 2. Perich. bract. 3. Male infl. 4. Bract. and  
antherid. p. Paraphyllia. pc. Perichaetium. 5. Capsule. 6. Calyptra. 8. Part of  
Peristome.



PTERYGOPHYLLACEÆ.



*Pterygophyllum lucens* (L.) Brid.

*Cyclodietyon læte-virens* (Hook. Tay.) Mitt.

*Daltonia splachnoides* (Sm.) Hook. Tay.

Fam. 20. PTERYGOPHYLLACEÆ.

Plants soft, irregularly branched, with few ramuli ; stem procumbent, depressed or ascending, dichotomous, pinnate or nearly simple. Leaves often compressed, narrow and patent on all sides, or broader, ovate, roundish or lingulate, complanate or laxly imbricated, in 5, 8 or 10 rows, one central, two intermediate, and two lateral on each side of stem ; the leaves of the central row on each side smaller, straight and appressed to stem, those of intermediate rows rather larger and oblique, and of the lateral rows patent, broader and often diversiform ; cells lax, hexagonal or rounded. Capsule erect, inclined or pendulous ; lid subulate ; teeth of peristome furrowed or cleft in the central line ; processes imperforate, without cilia ; calyptra conic or mitriform, smooth, papillose, hairy or with small scales ; the margin entire, many-lobed or ciliate.

A family of beautiful mosses, comprising about 500 species, especially abounding in the wooded valleys that descend from the Andes and in the islands of the W. Indies.

I. PTERYGOPHYLLUM *Bridel.*

Mantissa musc. 149 (1819).

Stem procumbent or suberect, with irregular complanate branches. Leaves in 8 or 10 rows, divergent and appressed, complanate, ovate or lanceolate ; cells rhomboid or hexagonal. Capsule ovate or elliptic ; lid rostrate ; calyptra campanulate-subulate, entire or lobulate at base ; peristome as in *Hypnum*, without cilia. Der.—πτέρυξ a wing, φύλλον a leaf.

Salisbury published in his *Paradisus Londinensis* his genus *Hookera*, named to commemorate the artist who did the plates in that work, and comprising two Liliaceous plants—*Hookera coronaria*, ii, t. 98 (dated March 1st, 1808), and *Hookera pulchella* t. 117 (dated September 1st, 1808). Smith read his paper on *Hookeria* (founded on *Hypnum lucens* L.) at the Linnean Soc. on April 8th, 1808, and at a subsequent meeting named Salisbury's *Hookera*—*Brodiaea*. He also published his *Hookeria lucens* in Eng. Bot. t. 1902 (dated June 1st, 1808) ; and thus Salisbury's name has priority, though, owing to the notorious jealousy and ill-will existing between him and Smith, I think it very probable that *Hookera* was published intentionally to anticipate Smith's *Hookeria*.

When we consider that at this time the war with France was raging, we may be certain that there was no exchange of literature between England and the Continent, and it happened that in 1814 Schleicher found an acrocarpous moss in Switzerland, which he sent to Schwaegrichen and Bridel, with the information that he named it *Hookeria splachnoides*, in honour of the English botanist.

Schwaegrichen published it in his Suppl. I, P. II, t. 100 (1816), and Bridel in the Mantissa p. 103 (1819); Hooker afterwards named this moss *Tayloria splashnoides*, Musc. exot. t. 173 (1820). At p. 149 Bridel established *Pterygophyllum*, citing Smith's *H. lucens* as a synonym, though he could hardly have then seen the Trans. Linn. Soc., for in Bry. univ. ii, 341 (1827), he laments that it cannot be maintained, as it was already occupied for the *Tayloria*.

### PTERYGOPHYLLUM LUCENS (L.) Brid.

Stem procumbent, compressed, irregularly branched; leaves complanate, roundish-ovate, obtuse, entire, nerveless. Capsule ovate; lid rostrate. (T. CXIX, A.)

SYN.—*Hypnum repens flicifolium ramosum, foliolis majoribus magisque crebris* DILL. in RAY Synops. 3 ed. 88, no. 45 (1724).

*Hypnum pennatum aquaticum lucens, longis latisque foliis* DILL. Hist. musc. 270, t. 34, f. 10 (1741) et Herbar.

*Hypnum lucens* L. Sp. plant. 1124 (1753). HUDS. Fl. Angl. 420 (1762). WITHER. Bot. arrang. ii, 681 (1776). LIGHTF. Fl. Scot. ii, 743 (1777). WEBER Spic. fl. goett. 52 (1778). ROTH Fl. Germ. i, 465 (1788). HOFFM. Deutsch. Fl. ii, 56 (1795). HEDW. Sp. musc. 243 (1801). BRID. Musc. rec. II, P. II, 128 (1801), Sp. musc. II, 100 (1812). SMITH. Fl. Brit. 1295 (1804). TURN. Musc. Hib. 155 (1804). WEB. MOHR Bot. Tasch. 347 (1807). ROEHL. Deutsch. Fl. iii, 100 (1813).

*Leskea lucens* MOENCH Fl. Marp. 739 (1794). LAM. & DEC. Syn. Fl. Franc. i, 513 (1805). SCHWAEGR. Suppl. I, P. II, 164, t. 84 (1816). FUNCK Moost. 54, t. 35 (1821).

*Hookeria lucens* SM. Trans. Linn. Soc. ix, 276, t. 23 (1808), Eng. Bot. t. 1902. HOOK. TAYL. Musc. Brit. 89, t. 27 (1818). HOOK. GREV. in Edinb. Journ. Sci. ii, 225 (1825). GRAY Nat. arrang. Br. pl. i, 751 (1821). HOOK. Fl. Scot. P. 2, 141 (1821). HUEBEN. Musc. Germ. 593 (1833). DE NOT. Syll. 59 (1838). RABENH. D. kr. fl. ii, s. 3, 256 (1848). C. MUELL. Synops. ii, 201 (1851). WILS. Bry. Brit. 416, t. 27 (1855). BERK. Handb. Br. m. 67, t. 3 (1863). HOBK. Synops. 184 (1873).

*Pterygophyllum lucens* BRID. Mant. musc. 149 (1819), Bry. univ. ii, 343 (1827). BR. SCH. Bry. Eur. fasc. 46—47, t. 1 (1851). SCHIMP. Synops. 481 (1860), 2 ed. 582. MILDE Bry. Siles. 297 (1869). DE NOT. Epilogo 63 (1869). BOUL. Musc. Fr. 176 (1884). LESQ. JAMES Moss. N. Amer. 293 (1884). HUSN. Musc. Gall. 296, t. 84 (1892). DIX. JAMES. Stud. Handb. 365 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 719, fig. 336 (1895).

Autoicous; in depressed soft shining pale tufts, becoming whiter when old; stem and leaves complanate, with short and few branches. Leaves narrow at base, rounded, upper larger, broadly ovate-oblong, plane, lateral erecto-patent, broad ovate, all obtuse; cells very lax rhomboid-hexagonal, one or two rows at margin narrow rectangular. Perich. bracts very small, oblong-lanceolate; seta stout, smooth, reddish; calyptra conico-campanulate; capsule elliptic, horizontal, small, castaneous, becoming black by age; lid convex-conic, rostrate; teeth reddish-brown.

HAB.—Moist shady banks; not rare. FR. 11—12.

Paris records 289 species of this genus, and the type *H. lucens* is the only species found in Europe. It is most frequent in the north of England, especially in Yorkshire and the Lake District; and damp hollows in clay banks are seldom unoccupied by it.



2. CYCLODICTYON *Mitt.*

Journ Linn. Soc. vii, 163 (1864).

Stems procumbent, vaguely branched or subpinnate. Leaves unequal, narrowly limbate, two-nerved; the cells wide, hexagono-rotundate or elliptic. Capsules inclined or horizontal; calyptra smooth or scabrous; teeth of peristome deeply sulcate in the middle line, densely articulate. Living on wet rocks and by water. Der.—κύκλος a circle, and δίκτυον a net.

CYCLODICTYON LÆTE-VIRENS (*Hook. Tayl.*) *Mitt.*

Autoicous; procumbent, subpinnate; leaves complanate, laxly imbricate, ovate with a short acumen, serrulate at apex; nerves  $\frac{3}{4}$  length of leaf. (T. CXIX, B.)

SYN.—*Hookeria læte-virens* HOOK. TAYL. Musc. Brit. 89, t. 27 (1818). HOOK. & GREV. in Edin. Journ. Sci. ii, 230 (1825). GRAY Nat. arr. Br. pl. i, 752 (1821). SCHWAEGL. Suppl. II, P. II, t. 163 (1826). C. MUELL. Synops. ii, 187 (1851). WILS. Bry. Brit. 417, t. 27 (1855). BERK. Handb. 68, t. 3 (1863). BR. SCH. Bry. Eur. fasc. 46—47, t. 1 (1851). SCHIMP. Synop. 480 (1860), 2 ed. 581. HOOK. Synop. 184 (1873). HUSN. Musc. Gall. 296, t. 84 (1892). DIX. JAMES. Stud. Handb. 364 (1896).

*Pterygophyllum læte-virens* BRID. Bry. univ. ii, 350 (1827).

*Hookeria albicans* (non HEDW.) TAYL. in Fl. Hib. P. 2, p. 36 (1836).

*Cyclodictyon læte-virens* MITT. in Journ. Linn. Soc. vii, 163 (1864). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 722 (1895).

Autoicous; stems 1—3 in. long, procumbent, subpinnate. Leaves deep green, not glossy; laxly imbricated, complanate, slightly undulated when dry, ovate or elliptic with a short acumen, serrulate at apex, and a narrow thickened border of 3—4 rows of cells; nerves two, divergent,  $\frac{3}{4}$  length of leaf; cells incrassate, hexagonal, rounded at corners, with ovate or elliptic ones intermixed. Perich. bracts erect, lanceolate-acuminate; seta reddish, smooth; capsule yellowish-brown, cernuous, elliptic; lid conic, rostrate, acute; teeth of peristome deeply sulcate in the middle, with a prominent reddish ridge on each side; processes lanceolate-subulate; cilia none.

HAB.—By waterfalls and shady hollows, and on wet rocks; rare. Fr. 10—12.

By a spring in Duncombe's wood, Cork (*Drummond* 1815). Torc waterfall and O'Sullivan's cascade, Killarney (*Taylor and Harvey*, 1831)!! Mousehole cave, Penzance (*Ralfs*)!!

About 60 species of this fine genus have been described, but the present is the only one found in Europe.

3. DALTONIA *Hook. Tayl.*

Musc. Brit. 80 (1818).

Stems erect, tufted; leaves crowded, spreading on all sides or complanate, ovato-lanceolate, the cells long and rhomboid. Calyptra

mitriform, fimbriate. Capsule very small, with a large rostrate lid, the seta often papillose. Teeth of peristome lanceolate-subulate, inner of 16 narrow processes.—Der. after Rev. J. Dalton.

### DALTONIA SPLACHNOIDES (Sm.) Hook. Tayl.

Autoicous; stems tufted, with fastigiate branches; leaves crowded, erecto-patent, linear-lanceolate, acuminate, with a thickened border; nerve vanishing below apex. Capsule oval-oblong, suberect on a roughish seta, the teeth long, lanceolate-subulate, inner as many subulate processes. (T. CXIX, C.)

SYN.—*Neckera splachnoides* (non SCHWÆG.) SM. Eng. Bot. t. 2564.

*Daltonia splachnoides* HOOK. TAYL. Musc. Brit. 80, t. 22 (1818). BRID. Bry. univ. ii, 255 (1827). SCHWÆG. Suppl. III, P. II, t. 295 (1829). BR. SCH. Bry. Eur. fasc. 44—45, t. 1 (1850). SCHIMP. Synops. 478 (1860), 2 ed. 580. C. MUELL. Synops. ii, 17 (1851). WILS. Bry. Brit. 418, t. 22 (1855). BERK. Handb. Br. m. 66, t. 3 (1863). HOBK. Synops. 184 (1873). HUSN. Musc. Gall. 295, t. 81 (1892). DIX. JAMES. Stud. Handb. 363 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 723 (1895).

*Hookeria splachnoides* HOOK. in Brit. Fl. ii, 74 (1833). TAYLOR in MACK. Fl. Hib. P. 2, p. 37 (1836).

Autoicous and synoicous; the plants very small, in deep green tufts, the stems creeping, with short erect branches. Leaves crowded, erecto-patent, octofarious, spreading on all sides, linear-lanceolate, acuminate, acute, with a narrow thickened border; nerve single, channelled, vanishing below apex; cells narrow, rhomboidal, below longish hexagonal, 3—4 basal rows quadrate, brown, the border of 2—5 rows of very narrow linear cells. Perich. bracts small, ovate acute; seta purple, papillose above; capsule very small, erect, brown, longish oval, finely papillose; calyptra mitriform, smooth, fringed with long linear processes; lid yellow, with a long straight beak; peristome white; teeth long and narrow, connivent when dry, recurved when moist, papillose, inner of same length, the processes very narrow and subulate, cilia none.

HAB.—Wet shady rocks, among hepatics and other mosses; rare. Fr. 9—10.

Secawn mountain, Dublin (*Taylor*). Torc mountain and Cromaglow, Killarney (*Wilson* 1829)!! Brandon mountain (*Moore*).

This little moss grows in small scattered tufts, and, except when in fruit, may be easily overlooked; its pale peristome then readily catches the eye. It is also found in the West Indies and Mexico, but not on the Continent of Europe. Nearly 300 species are referred to this genus.

TAB. CXIX. A. *Pterygophyllum lucens* (Saltburn, *R. Barnes*). B. *Cyclodictyon late-virens* (Mousehole cave, *Curnow*). C. *Daltonia splachnoides* (Killarney, *Holt*).

a. Fertile plant. 1. Leaf. 1 a. Apex. 1 b. Base. 2. Perich. bract. 3. Male infl.  
4. Bract and antheridia. 5. Capsule. 6. Calyptra. 8. Peristome. pc. Perichætium.



NECKERACEÆ.

Subf. 1. *NECKEREÆ*.

- Porotrichum alopecurum* (L.) Mitt.
- *acutifolium* (Holt) Dixon.
- Homalia trichomanoides* (Schreb.) Brid.
- Neckera complanata* (L.) Huds.
- *crispa* (L.) Hedw.
- *fontinaloides* (Lam.) Lindb.
- *pennata* (L.) Hedw.
- Alsia Smithii* (Dicks.) Lindb.

Subf. 2. *METEORIEÆ*.

- Climacium dendroides* (L.) W. M.
- Fontinalis antipyretica* L.
- *gracilis* Lindb.
- *dolosa* Cardot.
- *squamosa* L.
- *Dalecarlica* Schimp.
- *Dixoni* Cardot.
- *seriata* Lindb.

Subf. 3. *CRYPHÆEÆ*.

- Antitrichia curtipendula* (Hedw.) Brid.
- Leucodon sciuroides* (L.) Schwaeg.
- Cryphæa arborea* (Huds.) Lindb.
- *Lamyi* (Mont.) Lindb.
- Hedwigia imberbis* (Sm.) Spruce.
- *albicans* (Web.) Lindb.

## Fam. 21. NECKERACEÆ.

Primary stems creeping, the secondary erect, horizontal, pendulous or floating in water, pinnate and bipinnate. Leaves in 8 rows, equal on all sides or complanate and unequal, with a single nerve or two short ones, densely areolate, with rounded cells or sometimes with longer narrow ones. Capsules often immersed in the perichætium, or exserted on a short seta; calyptra cucullate or mitriform; peristome usually without cilia, sometimes simple or none.

We can form but a faint conception of this vast family if we only know our native species, for the bulk of them are confined to the Southern Hemisphere, and the whole family includes at least 800 species. The genus *Meteorium* is almost entirely tropical, and comprises probably 100 species. These mostly hang in long sheets from the branches of trees, and are sometimes rivalled by our *Antitrichia curtispindula*, which I have gathered in the forest of Fontainebleau quite 2 ft. long. The family is closely allied to the Pterygophyllaceæ, both exceedingly well dealt with by Mr. Mitten in his Musci Austro-Americani (Journ. Linn. Soc., vol. xii), whose arrangement I have followed.

Sect. 1. NECKERACEÆ. Fertile branches pinnate, plumiform, or tree-like and stipitate. Leaves compressed or rarely equal all round, usually unequal and distichous, glossy, rarely obscure; cells small and dense, smooth. Calyptra cucullate; peristome hypnoid or simple.

## 1. POROTRICHUM (Brid.) Mitt.

Bryol. univ. ii, 275 (1827).

Stem creeping, beset with rhizoids, the secondary erect, stoloniferous at base, free from branches in the lower half, dendroid above, the branches sub-bifarious and pinnate. Lowest leaves appressed, scattered; upper crowded, ovate or lanceolate; the cells roundish, the basal similar or elongated. Capsule erect or cernuous, ovate, with a rostrate lid; peristome as in *Hypnum*, inner with or without cilia.—Der. *πóρος* a perforation, *θήκη* hair, in reference to the foramina in processes of endostome.

This large genus of 175 species appears to connect the Hypnaceæ with Neckeraceæ, having the peristome of the former, but the habit and areolation of the latter. The newer name *Thamnium* cannot be maintained; it only differs from *Porotrichum* by the cernuous capsule and presence of cilia in the endostome, and besides had already been used for two genera of lichens and one of Ericaceæ.

## CLAVIS TO THE SPECIES.

Leaves ovate; nerve well defined, round.  
 — nearly linear; nerve very broad and flattened.

*alopecurum*.  
*angustifolium*.



# 1. **POROTRICHUM ALOPECURUM** (L.) Mitt.

Dioicous; stem dendroid, naked below, pinnately branched above. Leaves ovato-lanceolate, spreading, serrated; nerve round, vanishing below apex. Capsule ovate, cernuous; lid rostrate. (T. CXX, A.)

SYN.—*Muscus dendroides sylvarum erectus, ramulis Kali æmulis, radice repente* RAY Synops. 2 ed. 32 (1696).

*Hypnum palustre erectum arbusculum referens ramulis subrotundis* DILL. Cat. Giss. 220 (1718), et in RAY Synops. 3 ed. 81 (1724).

*Hypnum dendroides obscurius, setis et capsulis brevioribus nutantibus* DILL. Hist. musc. 315, t. 41, f. 49, et Herbar.

*Hypnum alopecurum* L. Sp. pl. 1128 (1753). HUDS. Fl. Angl. 426 (1762). WEISS Crypt. Goett. 246 (1770). NECK. Meth. musc. 186 (1771). WITHER. Bot. arr. ii, 687 (1776). LIGHTF. Fl. Scot. 757 (1777). WEB. Spic. Fl. Goett. 74 (1778). RELH. Fl. Cant. 414 (1785). VILLARS Pl. Dauph. iii, 917 (1786). ROTH Tent. Fl. Germ. i, 470 (1788). SIBTH. Fl. Oxon. 299 (1794). HOFFM. Deutsch. Fl. ii, 70 (1795). SWARTZ Musc. Suec. 60 (1799). HEDW. Sp. musc. 267 (1801). SM. Fl. Brit. 1302 (1804), Eng. Bot. t. 1182. TURN. Musc. Hib. 163 (1804). WEB. MOHR Bot. Tasch. 307 (1807). ROEHL. Deutsch. Fl. iii, 106 (1813). WAHLENB. Fl. Carp. 352 (1814). SCHWAEGL. Suppl. I, P. II, 265 (1816). BRID. Mant. 164 (1819), Bry. univ. ii, 444 (1827). HOOK. TAYL. Musc. Brit. 101 (1818). HOOK. Fl. Scot. P. II, 144 (1821). FUNCK Noost. 63, t. 45 (1821). GRAY Nat. arr. Br. pl. i, 758 (1821). HUEBEN. Musc. Germ. 662 (1833). RABENH. D. kr. fl. II, s. 3, 267 (1848). C. MUELL. Synops. ii, 501 (1851).

*Hypnum arbuscula* BRID. Musc. rec. II, P. II, 96 (1801), Sp. musc. II, 144 (1812). SCHULTZ Fl. Starg. 321 (1806).

*Isoetecium alopecurum* SPRUCE in Ann. Mag. Nat. Hist. 1849. WILS. Bry. Brit. 324 (1855).

*Thamnium alopecurum* BR. SCH. Bry. Eur. fasc. 49—51, p. 4, t. I (1852). SCHIMP. Synops. 574 (1860), 2 ed. 688. BERK. Handb. 149 (1863). MILDE Bry. Siles. 298 (1869). DE NOT. Epilogo 64 (1869). HOBK. Synops. 159 (1873). BOUL. Musc. Fr. 92 (1884). HUSN. Musc. Gall. 347, t. 100 (1893). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 239, f. 391 (1897).

*Porotrichum alopecurum* MITT. Journ. Lin. Soc. xii, 467 (1869). DIX. JAMES. Stud. Handb. 370 (1896).

Dioicous; stem creeping, subterranean, with stolons at base, secondary erect, naked and stipe-like in lower half, above with many pinnate slightly incurved branches, sub-complanate, growing in lax rigid dark green tufts. Leaves of lower stem distant, appressed, scarious, ovato-triangular, acute, nerved nearly to apex, upper crowded, broadly ovate, acutely pointed, serrated in the upper half; nerve strong, serrate at back, ending below apex; cells small, roundish, along the margin elongated, at base linear, orange. Perich. bracts lanceolate, recurved at point, nerveless; seta rather short, purple, smooth; capsule cernuous, castaneous, longish ovate, often slightly unequal; lid conic, rostrate. Teeth of peristome yellow, united at base, lineal-subulate; endostome a membrane half as high as the teeth, the processes fenestrate in the middle line, and with 2—3 filiform appendiculate cilia between, and of same length. Bracts of male infl. longish lanceolate, nerveless.

HAB.—On stones and banks in damp shady woods. Fr. II—I.

This fine moss is common, but the fruit is rare, and is produced on the upper part of the stem, sometimes in abundance.

Var. *β. acutum* Lindb. in litt.

Plants more slender; the stem and branch leaves both more acute, and with smaller cells; the branches very slender, acute, and julaceous.

HAB.—At O'Sullivan's cascade, Killarney, on wet rocks. ♀ ster., very scanty, and intermixed with the common species (July 22nd, 1873).

Lindberg regarded this as a species, but I prefer at present to treat it as a variety, as the characters appear to me quite comparative.

## 2. *POROTRICHUM ANGUSTIFOLIUM* (Holt) Dixon.

Dioicous; with the habit of last species, but more slender. Lower stem-leaves triangular, with a broad flattened nerve nearly reaching point, upper ovate serrate; branch-leaves linear. (T. CXX, B.)

SYN.—*Thamnium angustifolium* HOLT Journ. Bot. 1886, p. 65, t. 265. LIMPR. in RABENH. D. kr. fl. Laubm. iii, 243 (1897).

*Porotrichum angustifolium* DIX. JAMES. Stud. Handb. 371 (1896).

Dioicous; with the habit of *P. alopecurum*, but more slender and less complanate, bright yellowish-green. Stem creeping, with erect dendroid secondary stems, naked in the lower half, the branches slender, horizontal, the longer with a few short ramuli, the shorter simple. Lowest stem-leaves distant, squamose, triangular, entire, with a few small teeth at the acute apex, nerve vanishing below apex, very broad and flat,  $\frac{1}{3}$  width of leaf; upper erecto-patent, incurved when dry, ovate-acuminate, serrate, with these are some intermediate in form with the branch-leaves, which are linear, acutely pointed and sharply serrate in the upper half, the nerve nearly  $\frac{1}{3}$  width of leaf; cells oval above and larger than in last species, at base elongated and linear, those of nerves narrow, elongated, opaque with chlorophyl. Male infl. on the longer branches; bracts ovato-lanceolate, serrulate in upper half, nerveless, laxly areolate, with a large solitary antheridium and very few paraphyses. Fruit unknown.

HAB.—With *P. alopecurum* on shaded limestone rocks in Ravensdale, Derbyshire; very rare. (Holt 1883)!!

## 2. *HOMALIA* Bridel.

Bryol. univ. 325 (1827).

Stems creeping, stoloniferous, the secondary dichotomous and distichously branched. Leaves complanate, divergent in two rows, unsymmetric,



obtuse or apiculate, with a short nerve or none. Capsule symmetric, erect; lid rostrate; calyptra cucullate; peristome hypnoid.—Der. *ὁμαλός* flat.

Of this genus 62 species are recorded, and our species is very closely allied to *Neckera complanata*, the chief distinction being in the endostome, which in *Homalia* has a high basal membrane nearly half the length of the outer teeth.

### HOMALIA TRICHOMANOIDES (Schreb.) Brid.

Autoicous; irregularly pinnate. Leaves complanate, decurved, linguulate, obtuse, margin serrulate in upper half; nerve thin, reaching middle; capsule erect, cylindraceous. (T. CXX, C.)

SYN.—*Hypnum repens filicifolium romosum, ramulis surrectis et minus complanatis* DILL. Cat. Giss. 218 (1718), et in RAY Synops. 3 ed. 87.

*Hypnum pennatum, trichomanoides, splendens, ramosum* DILL. Hist. musc. 269, t. 34, f. 8 (1741), et Herbar.

*Hypnum complanatum* var.  $\beta$ . HUDS. Fl. Angl. 419 (1762).

*Hypnum trichomanoides* SCHREB. Spic. Fl. Lips. 88 (1771). HOFFM. Deutsch. Fl. ii, 56 (1795). WITHER. Bot. arrang. 3 ed. iii, 844 (1796). SMITH Fl. Brit. 1287 (1804), Eng. Bot. t. 1493. TURN. Musc. Hib. 143 (1804). P. BEAUV. Prodr. 71 (1805). HOOK. TAYL. Musc. Brit. 91 (1818), Fl. Scot. P. II, 141 (1821). GRAY Nat. arrang. Br. pl. i, 752 (1821). C. MUELL. Synops. ii, 229 (1851).

*Hypnum complanatum*  $\beta$ . *obtusum* EHRH. Hann. Mag. 1780, p. 237.

*Leskea trichomanoides* LEYSS. Fl. Hal. 267 (1783). ROTH Fl. Germ. 463 (1788). SIBTH. Fl. Oxon. 303 (1794). SWARTZ Musc. Succ. 58 (1799). BRID. Musc. rec. II, P. II, 36 (1801), Sp. musc. II, 51 (1812), Mant. 143 (1819). SCHULTZ Fl. Starg. 311 (1806). HEDW. Sp. musc. 232 (1801). WEB. MOHR Bot. Tasch. 216 (1807). ROEHL. Deutsch. Fl. iii, 85 (1813). SCHWAEGL. Suppl. I, P. II, 163 (1816). FUNCK Moost. 54, t. 35 (1821). HUEBEN. Musc. Germ. 579 (1833). DE NOT. Prodr. 61 (1838). RABENH. D. kr. fl. II, s. 3, 252 (1848).

*Fuscina trichomanoides* SCHRANK Bayer. Fl. ii, 451 (1789).

*Leskea Omalia trichomanoides* BRID. Bry. univ. ii, 329 (1827).

*Neckera trichomanoides* HARTM. Skand. Fl. 5 ed. 338 (1849).

*Homalia trichomanoides* BR. SCH. Bry. Eur. fasc. 44—45, p. 3, t. I (1850). WILS. Bry. Brit. 410 (1855). BERK. Handb. 72, t. 4 (1863). MILDE Bry. Siles. 284 (1869). DE NOT. Epilogo 198 (1869). SCHIMP. Synops. 472 (1860), 2 ed. 571. HOBK. Synops. 182 (1873). BOUL. Musc. Fr. 149 (1884). HUSN. Musc. Gall. 293, t. 83 (1892). DIX. JAMES. Stud. Handb. 362 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 715, f. 335 (1895).

Autoicous; growing in glossy light green cushions, repeatedly distichously branched and with basal stolons. Leaves distichous, the central and intermediate rows usually obsolete, complanate and decurved, unsymmetric, from a narrow base, cochleariform-lingulate, obtuse or shortly apiculate; margin inflexed on one side at base, eroso-serrate in the upper part; nerve thin, reaching middle, single or forked, sometimes none; cells small, roundish-hexagonal and rhombic above, rhomboidal at middle, linear at base, quadrate at angles. Inner perich. bracts convolute, pointed; seta red; capsule erect, symmetric, cylindraceous, reddish-brown; calyptra

cucullate; lid conic, obliquely rostrate, long as capsule; annulus of 2—3 rows. Peristome yellow; teeth lineal-subulate, inner on a membrane  $\frac{1}{3}$  as high; processes longer than the teeth, fenestrate in lower part; cilia rudimentary or none.

HAB.—In woods on bark of trees, rocks, and the ground. Fr. 9—10.

### 3. NECKERA *Hedw.*

Musc. frond. iii, 52 (1792).

Elegant mosses, growing in wide tufts on trees and rocks. Main stem creeping, often stoloniform; secondary stems ascending or pendulous, pinnate or bipinnate, the branches often elongated like a whip-lash. Leaves octofarious, compressed, the median and intermediate rows sometimes obsolete, the lateral distichaceous, divergent, unsymmetric, ovato-lanceolate or lingulate; cells small, oval or rhombic, linear below. Capsule immersed or exserted, regular; calyptra cucullate, sometimes with scattered hairs; peristome inserted deeply, of 16 lineal-lanceolate teeth; processes of endostome narrow linear, without cilia.—Named after N. J. Necker of Mannheim.

Hedwig first named this genus *Neckeria* (Fund. musc. P. 2, p. 93, 1782); but this had been already adopted by Scopoli for *Corydalis* in the Fumariaceæ (Introd. ad Hist. Nat. 313, 1777), and this was probably the reason why Hedwig altered it as above. The two seem to me to be sufficiently distinct in pronunciation, so that both may be retained; but in America P. Beauvois' genus *Eleutera* (1805) has been adopted. Paris enumerates 128 species.

#### CLAVIS TO THE SPECIES.

Leaves not transversely undulate.

—— transversely undulate.

Capsule exserted.

Robust; leaves lingulate, suddenly pointed.

Small; leaves lanceolate, gradually acute.

—— immersed.

*complanata.*

*crispa.*

*fontinaloides.*

*pennata.*

Sect. I. LEIOPHYLLUM *C. Muell.* Leaves not undulate.

#### I. NECKERA COMPLANATA (*L.*) *Hueb.*

Dioicous; growing in soft pale green tufts. Stems pinnate; branches crowded, often attenuated and flagelliform. Leaves complanate, not undulate, ovate-oblong, obtuse, apiculate, with two faint nerves at base; capsule roundish-elliptic, erect; lid rostrate. (T. CXX, D.)

SYN.—*Muscus vulgaris minor cauliculis compressis* RAY Synops. 244 (1690).

*Muscus terrestris surculis compressis, tenuior et minor* RAY Synops. 2 ed. 39 (1696).

*Hypnum repens filicifolium ramosum, ramulis appressis et magis complanatis* DILL. Cat. Giss. 218 (1718), et in RAY Synops. 3 ed. 87 (1724).

*Hypnum pennatum, compressum et splendens, capsulis ovatis* DILL. Hist. musc. 268, t. 34, f. 7 (1741) et Herb.

*Hypnum complanatum* L. Sp. plant. 1123 (1753). HUDS. Fl. Angl. 419 (1762). WEISS Crypt. Goett. 218 (1770). NECK. Meth. musc. 155 (1771). WITHER. Bot. arrang. ii, 681 (1776). LIGHTF. Fl. Scot. ii, 742 (1777). WEB. Spic. Fl. Goett. 49 (1778). RELH. Fl. Cant. 408 (1785). ROTH Tent. Fl. Germ. 464 (1788). HOFFM. Deutsch. Fl. ii, 57 (1795). SM. Fl. Brit. 1286 (1804), Eng. Bot. t. 1493. TURN. Musc. Hib. 154 (1804). P. BEAUV. Prodr. 62 (1805). HOOK. TAYL. Musc. Br. 91 (1818), Fl. Scot. II, 141 (1821). GRAY Nat. arrang. i, 752 (1821).

*Hypnum ornithopodioides* SCOP. Fl. Carn. 150 (1760).

*Leskea complanata* HEDW. Fund. musc. II, 93, t. 10, f. 62—65 (1782), Sp. musc. 281 (1801). SIBTH. Fl. Oxon. 302 (1794). SWARTZ Musc. Suec. 68 (1799). BRID. Musc. rec. II, P. II, 34, t. 1, f. 2 (1801), Sp. musc. II, 50 (1812), Mant. 143 (1819). SCHULTZ Fl. Starg. 68 (1806). WEB. MOHR Bot. Tasch. 243 (1807). ROEHL. Deutsch. Fl. iii, 85 (1813). WAHLENB. Fl. Lapp. 567 (1812). SCHWAEGL. Suppl. I, P. II, 163 (1816). FUNCK Moost. 54, t. 35 (1821). DE NOT. Syllab. 61 (1838). RABENH. D. kr. fl. II, s. 3, 252 (1848).

*Leskea Omalia complanata* BRID. Bry. univ. ii, 327 (1827).

*Neckera complanata* HUEBEN. Musc. Germ. 576 (1833). C. MUELL. Synops. ii, 43 (1851). BR. SCH. Bry. Eur. fasc. 44—45, p. 9, t. 5 (1850). WILS. Bry. Brit. 411 (1855). SCHIMP. Synops. 470 (1860), 2 ed. 569. BERK. Handb. 71, t. 4 (1863). MILDE Bry. Siles. 283 (1869). HOBK. Synop. 182 (1873). BOULAY Musc. Fr. 184 (1884). LESQ. JAMES Moss. N. Amer. 200 (1884). HUSN. Musc. Gall. 292, t. 83 (1892). DIX. JAMES. Stud. Handb. 361 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 710 (1895).

*Homalia complanata* DE NOT. Epilogo 199 (1869).

*Eleutera ornithopodioides* STUNTZ in Bull. Torrey Bot. Club xxvii, 209 (1900).

Diocious ; growing in lax pale green glossy tufts ; stems very slender, the secondary ascending, pinnate, the branches often lash-like at end, with a few lanceolate paraphyllia. Leaves unsymmetric, complanate, not undulate, oblong-lingulate, obtuse with a short apiculus, finely serrulate at apex, the margin inflexed on one side at base ; cells rhombic above, linear below, and oval at the decurrent basal angles ; nerve none, or short and forked ; leaves of the flagella ovato-lanceolate. Inner perich. bracts long and sheathing, lanceolate-acuminate ; seta rather short, stramineous ; capsule erect, elliptic-oval, reddish-yellow ; lid obliquely rostrate, half length of capsule ; calyptra naked, or with a few scattered hairs ; teeth of peristome pale yellow, narrow and lineal ; processes of endostome half as long.

HAB.—Trunks and branches of trees, sometimes on rocks. Fr. 11—12.

Var. *β. tenella* Schimp.

Very small and creeping. Leaves only half as large, obovate-lanceolate, short-pointed, nerveless ; all the cells wider, rhombic.

Bry. Eur. Coroll. 100 (1856). LIMPR. Laubm. ii, 711. *Neckera tenella* KINDB. Laubm. Schwed. u. Norw. 5 (1883).

HAB.—Near Castle Mill, Ringway (Wilson 1833)! Near Ladbrook, Warwick (Bagnall 1876).

Sect. 2. RHYSTOPHYLLUM Ehrh. Leaves transversely undulated.

2. *NECKERA CRISPA* (L.) Hedw.

Dioicous; robust, in large lax tufts. Stem pinnate; leaves complanate, strongly undulate, ovate-oblong, apiculate, with a short faint nerve at base. Capsule on a short seta, erect, roundish ovate. (T. CXXI, A.)

SYN.—*Muscus terrestris major, ramulis compressis foliis superficiei crispis* Doody. RAY Synops. 2 ed. 337 (1696).

*Hypnum repens crispum ramulis compressis, filicinorum more dispositis* DILL. Cat. Giss. 217 (1718), et in RAY Synops. 3 ed. 89 (1724).

*Hypnum pennatum undulatum crispum, setis et capsulis brevibus* DILL. Hist. musc. 273, t. 36 f. 12 A. B. (1741) et Herb.

*Hypnum crispum* L. Sp. plant. 1124 (1753). HUDS. Fl. Angl. 420 (1762). WEISS Crypt. Goett. 221 (1770). NECK. Meth. musc. 153 (1771). WITHER. Bot. arrang. ii, 682 (1776). LIGHTF. Fl. Scot. ii, 745 (1777). WEB. Spic. Fl. Goett. 54 (1778).

*Neckera crispa* HEDW. Fund. musc. II, 93, t. 12, f. 47—48 (1782). Sp. musc. 206 (1801). ROTH Fl. Germ. i, 462 (1788). BRID. Musc. rec. II, P. II, 11 (1801). Sp. musc. II, 27, (1812), Mant. 138 (1819). SWARTZ Musc. succ. 70 (1799). SM. Fl. Brit. 1273 (1804). Eng. Bot. t. 617. TURN. Musc. Hib. 101 (1804). WEB. MOHR Bot. Tasch. 238 (1807). ROEHL. Deutsch. fl. iii, 83 (1813). WAHLENB. Fl. Carp. 355 (1814). SCHWAEG. Suppl. I, P. II, 147 (1816). HOOK. TAYL. Musc. Brit. 78 (1818). SCHULTZ Suppl. Fl. Starg. 74 (1819). FUNCK Moost. 53, t. 33 (1821). HOOK. Fl. Scot. II, 138 (1821). GRAY Nat. arrang. i, 748 (1821). HUEBEN. Musc. Germ. 573 (1833). DE NOT. Syllab. 68 (1838). Epilogo 194 (1869). RABENH. D. kr. fl. II, S. 3, 302 (1848). C. MUELL. Synops. ii, 54 (1851). BR. SCH. Bry. Eur. fasc. 44—45, p. 9, t. 4 (1850). SCHIMP. Synops. 469 (1860), 2 ed. 568. WILS. Bry. Brit. 412 (1855). BERK. Handb. 70, t. 4 (1863). MILDE Bry. Siles. 283 (1869). HOBK. Synops. 183 (1873). JURATZ. Laubm. flora Oester.-Ung. 364 (1882). BOULAY Musc. Fr. 181 (1884). HUSN. Musc. Gall. 291, t. 82 (1892). DIX. JAMES. Stud. Handb. 360 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 707, Fig. 333 (1895).

*Leskea crispa* SCHRANK Prim. Fl. Salisb. 835 (1792).

*Neckera Distichia crispa* BRID. Bry. univ. ii, 246 (1827).

Dioicous; growing in large robust tufts, glossy, yellowish or brownish green, ferruginous at base. Secondary stem 4—8 in. long, irregularly pinnate, ascending at points. Leaves erecto-patent, unsymmetric, inflexed on one side at base, broadly lingulate, with a short apiculus, and 5—6 transverse semicircular striæ, serrate at point; nerve none, or short and forked; cells rhombic above, linear below, roundish at basal angles. Perich. bracts lanceolate, the inner convolute, tubular, longly acuminate, nerved to middle; seta thrice as long, pale yellowish; capsule erect, roundish-ovate, yellowish-brown; calyptra slightly hairy when young, lid long as capsule, with a subulate beak. Peristome pale yellow, teeth narrow linear-lanceolate, endostome a narrow basal membrane with processes subulate and half as long as teeth.

HAB.—Trunks of trees and rocks, not uncommon. Fr. 11—3.

Var. *β. falcata* Boul. Musc. Fran. 181 (1884).

Branches denser, shorter, hooked at point. Leaves concave, falcato-secund, dark lurid green, less undulated.



HAB.—Dry subalpine rocks, especially on limestone.

Foot of Schiehallion (*Braithwaite* 1883) !! and Stream from Craigailleach into Glen Lochay, Perthshire !! Hall Dale, Mill Dale, Stafford (*Bagnall* 1895) !!

This fine moss is very luxuriant on the horizontal branches of trees at Muckross Abbey, Killarney, and is readily known by the beautiful striated leaves.

### 3. *NECKERA FONTINALOIDES* (Lam.) Lindb.

Dioicous ; stem subpinnate, with short complanate branches. Leaves complanate, ovate-oblong, apiculate or acuminate, one or both margins reflexed at base, serrulate, two-nerved at base, slightly undulate. Capsule elliptic. (T. CXXI, B.)

SYN.—*Fontinalis pennata* (non L.) HUDS. Fl. Angl. 398 (1762).

*Hypnum pennatum* DICKS. Crypt. Fasc. I, t. 1, f. 8 (1785).

*Hypnum fontinaloides* LAMARCK Encyc. Meth. Bot. iii, 164 (1789).

*Hypnum pumilum* GMEL. Syst. Nat. 1341 et *H. Dicksoni* ibid. 1342 (1791).

*Neckera pumila* HEDW. Musc. frond. iii, 49, t. 20 (1792), Sp. musc. 205 (1801). BRID. Musc. rec. II, P. II, p. 10 (1801), Sp. musc. II, 27 (1812), Mant. 137 (1819). SM. Fl. Brit. 1270 (1804), Eng. Bot. t. 1443. SCHWAG. Suppl. I, P. II, 147 (1816). HOOK. TAYL. Musc. Brit. 77 (1818). HOOK. Fl. Scot. P. II, 138 (1821). GRAY Nat. arrang. i, 747 (1821). HUEBEN. Musc. Germ. 575 (1833). DE NOT. Syllab. 68 (1838), Epilogo 195 (1869). RABENH. D. kr. fl. II, S. 3, 302 (1848). BR. SCH. Bry. Eur. fasc. 44—45, p. 8, t. 3 (1850). C. MUELL. Synops. ii, 56 (1851). WILS. Bry. Brit. 413 (1855). SCHIMP. Synops. 468 (1860), 2 ed. 567. BERK. Handb. 70, t. 4 (1863). MILDE Bry. Siles. 282 (1869). HOBK. Synops. 183 (1873). JURATZ. Laubm. fl. Oester.-Ung. 363 (1882). BOUL. Musc. Fr. 183 (1884). HUSN. Musc. Gall. 291, t. 82 (1892). DIX. JAMES. Stud. Handb. 361 (1896). LIMFR. in RABENH. D. kr. fl. Laubm. ii, 705 (1895).

*Pilotrichum pumilum* P. BEAUV. Prodr. 83 (1805).

*Neckera Distichia pumila* BRID. Bry. univ. ii, 244 (1827).

*Neckera fontinaloides* Lindb. Musc. Scand. 40 (1879).

Dioicous ; in small depressed deep green rather glossy tufts ; secondary stem complanate, closely pinnate, the branches short and obtuse or flagelliferous, sometimes with axillar bulbils. Leaves undulate when dry, crowded, ovate-oblong, concave, acute or acuminate, serrate at point, nerves two indistinct or none, margin on one side inflexed, on the other reflexed ; cells rhombic and oval above, at angles a few yellow and oval ; leaves of flagella spreading, ovato-lanceolate with fine points. Perichaetial bracts erect sheathing, lanceolate-acuminate ; seta short, capsule erect, elliptic, reddish-brown ; calyptra cucullate, lid conical, rostellate, acute ; teeth of peristome reddish, lineal-lanceolate, endostome a hyaline membrane with filiform processes.

HAB.—On trunks of trees, sometimes on rocks, not common. Fr. 10—11.

Woods in Sussex. New Forest. Inveraray and Cleish. Dolgelly. Holwick Wood, Teesdale (*Spruce*). Gilla Leys and Ray Wood, Castle Howard (*Baker*).



Var. *β. Phillippei* (*Br. Sch.*) *Lindb.*

Plants prostrate. Leaves strongly undulate, suddenly ending in a long narrow flexuose serrated point.

SYN.—*Neckera Philippeana* Bry. Eur. fasc. 44—45, p. 11, t. 6 (1850). SCHIMP. Synops. 471.

*Neckera pumila* var. *pilifera* JURAT. in RABENH. Bryoth. n. 749.

— *pumila* var. *Philippeana* MILDE Bry. Siles. 282. LIMPR. op. c. p. 706.

— *fontinaloides* var. *Phillippei* LINDB. Musc. Scand. 40.

HAB.—Usually with the type; rare.

Ash tree at Langrick Castle, Callander (*McKinlay* 1861) 11 Inverarnan, Glen Falloch (*McKinlay* 1863). Devonshire c. fr. (*Dixon*).

4. *NECKERA PENNATA* (*L.*) *Hedw.*

Autoicous; in flat glossy yellowish-green cushions. Stems pinnate, with complanate branches; leaves ovato-lanceolate, longish ovate, acuminate, entire, nerveless. Capsule oblong, immersed. (T. CXXI, C.)

SYN.—*Sphagnum pennatum undulatum*, *vagina squamosa* DILL. Hist. musc. 250, t. 32, f. 9 (1741) et Herb.

*Fontinalis pennata* L. Sp. pl. 2 ed. 1371 (1763). WEB. Spic. FL Goett. 37 (1778). ROTH Fl. Germ. i, 478 (1788).

*Hypnum pennatum* HALL. Hist. st. Helv. no. 1297, t. 45, f. 2 (1768). GMEL. Syst. nat. ii, 1340 (1791). HOFFM. Deutsch. fl. ii, 57 (1795).

*Weissia pennata* SCHRANK Baiers. Fl. ii, 445 (1789).

*Neckera pennata* HEDW. Descr. iii, 17, t. 19 (1792), Sp. musc. 100 (1801). SWARTZ Musc. Succ. 70 (1799). BRID. Musc. rec. II, P. II, 2 (1801), Sp. musc. II, 23 (1812), Mant. 137 (1819). WEB. MOHR. Bot. Taschen. 239 (1807). SCHWAEGL. Suppl. I, P. II, 144 (1816). FUNCK Moost. 52, t. 34 (1821). GREV. Scot. Cr. Fl. ii, t. 109 (1825). HOOK. TAYL. Musc. Brit. 2 ed. 135, t. 4 suppl. (1827). HUEBEN. Musc. Germ. 570 (1833). DE NOT. Syllab. 69 (1838), Epilogo 195 (1869). RABENH. D. kr. fl. II, S. 3, 302 (1848). BR. SCH. Bry. Eur. fasc. 44—45, p. 6, t. I (1850). C. MUELL. Synops. ii, 50 (1851). WILS. Bry. Brit. 414, t. 34 (1855). SCHIMP. Synops. 467 (1860), 2 ed. 565. BERK. Handb. 69 (1863). MILDE Bry. Siles. 281 (1869). HOBK. Synops. 183 (1873). JURATZ. Laubm. fl. Oester.-Ung. 361 (1882). BOULAY Musc. Fr. 184 (1884). HUSN. Musc. Gall. 290, t. 82 (1892). DIX. JAMES. Stud. Handb. 360 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 703 (1895).

*Pilotrichum pennatum* BEAUV. Prodr. 83 (1805).

*Cryptopodia pennata* ROEHL. Deutsch. Fl. iii, 82 (1813).

*Daltonia pennata* WALK.-ARN. Disp. 54 (1825). DUBY Bot. Gall. 553 (1830).

*Neckera Distichia pennata* BRID. Bry. univ. ii, 238 (1827).

*Eleutera pennata* STUNTZ Bull. Torrey Bot. Club xxvii, 205 (1900).

Autoicous; growing in flat yellowish-green glossy cushions, 2—4 in. high. Secondary stems ascending, irregularly pinnate; branches short spreading complanate. Leaves ovato-lanceolate, somewhat unsymmetric, gradually pointed, the margin inflexed on one side at the base, serrulate in lower half, with 3—5 faint undulations when dry, nerveless or sometimes with two short nerves; cells above longish rhombic, below narrow and linear, roundish-quadrate at angles. Perich. bracts lanceolate-acuminate,

nerveless, entire, the inner overtopping the capsule, which is longish oval, castaneous. Calyptra very small, whitish, lid conical with a short oblique beak. Teeth of peristome lanceolate-subulate, converging into a cone when moist, pale yellow, processes of endostome short, fugacious.

HAB.—Trunks of trees, very rare. Fr. 3—4.

On a beech tree at Fotheringham near Forfar (*Drummond*). Colin Glen, Belfast (*D. Orr* 1849), not found now. Balinore Woods, Argyll (*Paterson* 1875).

#### 4. ALSIA *Sulliv.*

Proc. Amer. Acad. Arts & Sci. iii, 184 (1854).

Main stem creeping, radiculose, defoliate at base, the branches pinnate, flat when moist, circinately involute when dry, not glossy. Leaves small ovate obtuse, the cells small and rounded. Capsule with a hairy vaginula, elliptic, emergent from an elongated perichætium; calyptra cucullate, slightly hairy or smooth; lid conico-rostrate, annulus none; teeth 16 small, pale lineal-lanceolate, endostome a narrow membrane, sometimes with short filiform processes. Inhabiting trees.—Der. An anagram of the allied genus *Lasia*.

The genus *Leptodon* was founded by Mohr on Hedwig's *Pterigynandrum trichomitrium* and with it *Lasia* of Beauvois should probably be united. The presence of an endostome and the curious curling up on drying are the chief characteristics of *Alsia*.

#### ALSIA SMITHII (*Dicks.*) *Lindb.*

Dioicous; prostrate, pinnate or bipinnate, circularly involute when dry. Leaves roundish-ovate, obtuse, entire, nerved to the middle; seta very short, capsule elliptical, lid rostrate. (T. CXXII, A.)

SYN.—*Hypnum Smithii* DICKS. Pl. exsicc. no. 19 (1789), Crypt. Fasc. II, 10, t. 5, f. 4 (1790). WITH. Bot. arrang. 3 ed. iii, 851 (1796). HEDW. Sp. musc. 264 (1801).

*Orthotrichum Smithii* BRID. Musc. rec. II, P. II, 33 (1801).

*Neckera bipinnata* SCHLEICH. Crypt. helv. cent. IV, n. 20.

*Pterogonium Smithii* SW. in SCHRAD. Journ. ii, 173 (1801). SM. Fl. Brit. 1271 (1804), Eng. Bot. t. 1326. SCHWAG. Suppl. I, P. I, 105, et II, P. I, 31, t. 109 (1823). HOOK. TAYL. Musc. Brit. 40, t. 14 (1818). GRAY Nat. arrang. i, 728 (1821).

*Leptodon Smithii* MOHR Observ. 27 (1803). BRID. Bry. univ. ii, 197 (1827). HUEBEN. Musc. Germ. 547 (1833). DE NOT. Syllab. 82 (1838), Epilogo 222 (1869). BR. SCH. Bry. Eur. fasc. 44—45 (1850). WILS. Bry. Br. 317, t. 14 (1855). SCHIMP. Synops. 464 (1860), 2 ed. 562. BERK. Handb. 154, t. 13 (1863). MILDE Bry. Siles. 280 (1869). HOBK. Synops. 140 (1873). JURATZ. Laubm. flora Oester.-Ung. 360 (1882). BOULAY Musc. Fr. 186 (1884). HUSN. Musc. Gall. 289, t. 82 (1892). DIX. JAMES. Stud. Handb. 376 (1896). LIMPR. in RABEN. D. kr. fl. Laubm. ii, 693, f. 332 (1894).

*Pilotrichum Smithii* P. BEAUV. Prodr. 83 (1805).

*Pterigynandrum Smithii* BRID. Sp. musc. I, 140 (1806).

*Lasia Smithii* BRID. Mant. 133 (1819).

*Hookeria convoluta* SPRENG. Syst. nat. iv, P. 2, p. 324 (1827).

*Neckera (Leptodon) Smithii* C. MUELL. Synops. ii, 118 (1850).

*Alsia Smithii* LINDB. Journ. Linn. Soc. xiii, 71 (1871).

Dioicous ; in depressed bright or dingy green tufts. Secondary stems densely pinnate and bipinnate ; the branches sometimes long and flagelliform, complanate when moist, when dry spirally involute, and with many small lineal paraphyllia in the leaf axils. Leaves in 8 rows, the dorsal and ventral incumbent, the lateral divergent, asymmetric, linguiform, nerved for  $\frac{2}{3}$  their length ; cells minute roundish, at base on both sides of nerve longish rectangular. Perich. bracts broadly lanceolate, the inner long and acuminate, vaginula with long hairs reaching the capsule, which is exerted on a very short seta, oval and reddish-brown. Calyptra cucullate, with scattered hairs ; lid conical, obliquely rostellate ; teeth of peristome whitish, lineal-lanceolate, papillose, splitting in the median line, endostome a narrow basal membrane.

HAB.—On bark of trees and on rocks. Fr. 4, rare.

Most frequent in Sussex and Devonshire. Barham downs, Kent (*Smith*).

The American *Alsia abietina* SULLIV. (Icones t. 72 b) is closely allied to the present species.

Sect. 2. METEORIEÆ. Fertile branches arising from a creeping stem, or on long pendulous or floating stems, sometimes with shrublike branches. Leaves equal on all sides or in rows or compressed, sometimes bifarious, glossy or obscure, and with narrow cells.

## 5. CLIMACIUM *Web. Mohr*.

Reise durch Schweden, p. 96 (1804).

Stem subterranean, rhizomatoid, beset with radicles ; secondary stems erect and dendroid, with simple branches at top, and squamose appressed leaves ; those of the branches ovate, nerved, plicate, with narrow rhombic cells. Capsule erect, cylindraceous ; calyptra slit up on one side ; peristome of 16 teeth, united at base, endostome a narrow basal membrane with ladder-like processes and no cilia.—Der. κλίμαξ, a ladder.

A small genus of dendroid mosses, from which Lindberg removed the Australian *C. sulcatum* (Hook.) Bridel, to form the genus *Braithwaitea*. There is much superficial resemblance between the present species and *Porotrichum alopecurum* ; the latter, however, is nearer to Hypnaceæ, and forms a connecting link between the two families.

**CLIMACIUM DENDROIDES (L.) Web. Mohr.**

Dioicous; leaves divergent, ovato-lanceolate, serrulate at apex, bisulcate, decurrent at angles, nerved; cells very narrow. Capsules numerous, erect, oblong, castaneous; lid rostrate, systilious, peristome rufous, incurved when dry. (T. CXXI, D.)

SYN.—*Muscus dendroides elatior ramulis crebris minus surculosis, capitulis pediculis brevibus insidentibus* RAY Synops. 2 ed. 32, n. 23 (1696).

*Hypnum erectum arbusculam referens, ramulis subrotundis confertim nascentibus* DILL. in RAY Synops. 3 ed. 81, no. 9 (1724).

*Hypnum dendroides sericeum, setis et capsulis longioribus erectis* DILL. Hist. musc. 313, t. 40, f. 48 (1741) et Herb.

*Hypnum dendroides* L. Sp. plant. 1128 (1753). HUDS. Fl. Angl. 426 (1762). OEDER Fl. Dan. t. 823 (1780). WEISS Crypt. Goett. 245 (1770). NECK. Meth. musc. 187 (1771). WITHER. Bot. arrang. ii, 687 (1776). LIGHTF. Fl. Scot. ii, 756 (1777). WEBER Spic. Fl. Goett. 74 (1778). RELH. Fl. cant. 413 (1785). HOFFM. Deutsch. Fl. ii, 70 (1795). SM. Fl. Brit. 1283 (1804), Eng. Bot. t. 1565. TURN. Musc. Hib. 138 (1804). P. BEAUV. Prodr. 63 (1805). HOOK. TAYL. Musc. Brit. 101 (1818). GRAY Nat. arr. i, 758 (1821).

*Neckera dendroides* TIMM. Prod. Fl. megap. 221 (1788). ROTH Fl. Germ. i, 462 (1788). SWARTZ Musc. Succ. 69 (1799). BRID. Musc. rec. II, P. II, 15 (1801). SCHULTZ Fl. Starg. 307 (1806). C. MUELL. Synops. ii, 121 (1851).

*Leskea dendroides* HEDW. Sp. musc. 228 (1801). LAM. & CAND. Fl. Franc. i, 516 (1805). WAHLENB. Fl. Succ. ii, 714 (1826). DE NOT. Syllab. 62 (1838).

*Climacium dendroides* WEB. MOHR Reis. in Schwed. 96 (1804), Bot. Taschen. 252 (1807). WAHLENB. Fl. Lapp. 370 (1812), Fl. Carp. 357 (1814). ROEHL. Deutsch. Fl. iii, 84 (1813). BRID. Sp. musc. II, 44 (1812), Mant. 142 (1819), Bry. univ. ii, 271 (1827). SCHWAEGL. Suppl. I, P. II, 141, t. 81 (1816). FUNCK Moost. 52, t. 33 (1821). HUEBEN. Musc. germ. 595 (1833). BR. SCH. Bry. Eur. fasc. 16, p. 5 (1842). RABENH. D. kr. fl. II, S. 3, 257 (1848). WILS. Bry. Brit. 325 (1855). SCHIMP. Synops. 517 (1860), 2 ed. 627. BERK. Handb. 140, t. 13 (1863). MILDE Bry. Siles. 289 (1869). DE NOT. Epilogo 201 (1869). HOBK. Synops. 142 (1873). BOULAY Musc. Fr. 153 (1884). HUSNOT Musc. Gall. 315, t. 90 (1892). LIMPR. in RAB. D. kr. fl. Laubm. iii, 34, f. 358 (1896). DIX. JAMES. Stud. Handb. 388 (1896).

Dioicous; plants associated, but detached from each other, bright yellowish-green, slightly glossy; main stem subterranean, rhizomatoid, radiculose, secondary stems erect, reddish, the leaves squamose, erect and appressed, the branches crowded at the top, mostly simple, rigid and divergent. Upper leaves crowded, erecto-patent, lingulate, coarsely serrate at apex, biplicate, nerve vanishing below apex; cells narrow and rhombic above, lineal below, expanded and rhombic at angles. Perich. bracts erect, ovate with long acute points, entire with a short nerve; seta long, purple, capsule erect, cylindraceous, castaneous; calyptra long, enclosing all capsule, lid half length of capsule, convex rostrate, united to columella when cast off. Peristome of 16 papillose teeth united at base, lanceolate, rufous; endostome a very narrow basal membrane with 16 orange lineal processes as long as the teeth, cleft in the middle nearly all the length, without cilia.

HAB.—Wet places in fields and moorlands, frequent. Fr. II—2.



Var. *β. depauperata* Boulay Musc. Fr. 154.

Stems very short with fewer and shorter branches, obtuse, dark lurid green. Leaves closely imbricated, shorter, somewhat recurved at points.

HAB.—Sandy places near water. Sand dunes at St. Anne's, Lancs. (Beesley 1900)!! S. shore of Loch Tay (*Braithwaite* 1902)!!

## 6. FONTINALIS (*Dill.*) *L.*

Glossy mosses with long slender stems, floating in water, fixed only at base, with numerous branches, often naked at lower part. Leaves trifarious, equal, ovate or lanceolate, folded together into a keel, or round at back, entire, smooth, nerveless; cells prosenchymatous, long and narrow, without chlorophyl, the basal angular quadrate or rectangular. Perich. bracts large, appressed to capsule, obovate or circular; capsule enclosed in the bracts, oval or ovate, the lid conical, calyptra small, conical; peristome of 16 lanceolate teeth united at point in pairs, papillose; endostome a latticed cone, composed of 16 filiform processes connected together by horizontal bars, which have often appendages directed inward.—Der. *fons*, a fountain.

This remarkable genus has been greatly extended by the investigations of M. Cardot, who divided it into no less than 6 sections as follows (Rev. bryol. 1891, p. 81).

1. *Tropidophyllæ*. Leaves generally uniform, rarely more or less dimorphous, somewhat firm, oval-lanceolate or oblong-lanceolate, diversely acuminate, typically carinate-conducuplicate, the branch-leaves sometimes rounded at back. *F. antipyrethica* L., *F. gracilis* LIND., *F. dolosa* CARD.
2. *Heterophyllæ*. Leaves mostly dimorphous, not carinate, the cauline widely oval-lanceolate or lanceolate, more or less longly narrowly acuminate, the ramcal much smaller, narrowly lanceolate, channelled or tubular at point, rigid when dry.
3. *Lepidophyllæ*. Leaves uniform, not carinate, rather firm, oval-lanceolate or oblong-lanceolate, sometimes narrowly lanceolate, diversely acuminate. *F. squamosa* L., *F. dalecarlica* B. and S., *F. Dixoni* CARD.
4. *Malacophyllæ*. Leaves uniform, or nearly so, slightly concave or nearly plane, usually very soft and distant, oval-lanceolate or narrowly lanceolate, and nearly all longly and narrowly acuminate. *F. seriata* LINDB.
5. *Stenophyllæ*. Leaves uniform, channelled, rather firm, narrowly lanceolate, longly acuminate.
6. *Solenophyllæ*. Leaves uniform, narrowly lanceolate, rigid, tubular or channelled at the point.

In 1902 M. Cardot elaborated his "Monographie des Fontinalacées" (Mémoires de la Soc. nationale des Sciences naturelles et mathématiques de Cherbourg, Tom. xxviii.), probably the most perfect specimen of a monograph that has yet appeared. In this the species were raised to 36, and additions are still being made to the list, so that above 50 are now known.

From what I have observed in the structure of the endostome, there are considerable differences in the armature of the transverse bars, which will, I think, afford useful characters in the discrimination of species, especially as in no genus of mosses is there so little difference in the cell-structure of the leaves, as in *Fontinalis*; the fruit, however, is too often conspicuous by its absence.



## I. FONTINALIS ANTIPYRETICA L.

Dioicous ; robust, dull green. Stems long, robust, triquetrous-leaved, the leaves decurrent, ovate-lanceolate, sharply keeled, reflexed on one side at margin. Capsule immersed, perich. bracts large rounded. (T. CXXII, B.)

SYN.—*Muscus aquaticus terrestri vulgari similis, sed major* RAY Synops. 17 n. 7 (1690).

*Fontinalis triangularis major complicata, e foliorum alis capsulifera* DILL. Hist. musc. 254, t. 33, f. 1 (1741) et Herb.

*Fontinalis antipyretica* L. Sp. plant. 1107 (1753). HUDS. Fl. Angl. 398 (1762). WEISS Crypt. Goett. 261 (1770). WITHER. Bot. arrang. ii, 691 (1776). LIGHTF. Fl. Scot. ii, 694 (1777). NECK. Del. gallo-belg. ii, 441 (1778). HEDW. Fund. 1, t. 5, f. 27 et 11, 97, t. 1, f. 5, et t. 4, f. 14—15 et t. 9, f. 53—55 (1782), Sp. musc. 298 (1801). RELHAN Fl. cant. 395 (1785). ROTH Tent. fl. germ. 1, 478 (1788). SIBTH. Fl. oxon. 293 (1794). HOFFM. Deuts. fl. ii, 79 (1795). SWARTZ Musc. succ. 72 (1799). BRID. Musc. rec. 111, 157 (1803), Sp. musc. III, 107 (1817), Mant. 186 (1819), Bry. univ. ii, 655 (1827). SMITH Fl. Brit. 1336 (1804), Eng. Bot. t. 359. TURN. Musc. hib. 199 (1804). P. BEAUV. Prodr. 57 (1805). SCHULTZ Fl. Starg. 356 (1806). WEB. MOHR Bot. Tasch. 376 (1807). WAHLEN. Fl. Lapp. 382 (1812), Fl. Carpat. 353 (1814). ROEHL. Deutsch. fl. iii, 121 (1813). SCHWAEGL. Suppl. 1, P. II, 507 (1816). HOOK. TAYL. Musc. Brit. 82 (1818), Fl. Scot. P. 2, 138 (1821). FUNCK Moost. 67, t. 53 (1821). GRAY Nat. arrang. i, 749 (1821). HUEBEN. Musc. Germ. 700 (1833). DE NOT. Syll. 1 (1838), Epilogo 60 (1869). BR. SCH. Bry. Eur. fasc. 16, p. 4, t. 2 (1842). RABENH. D. kr. fl. II, S. 3, 245 (1848). WILS. Bry. Brit. 423 (1855). SCHIMP. Synops. 456 (1860), 2 ed. 552. BERK. Handb. 62, t. 3 (1863). MILDE Bry. Siles. 275 (1869). HOBK. Synops. 185 (1873). LESQ. JAMES Moss. N. Amer. 268 (1884). BOULAY Musc. Fr. 189 (1884). HUSN. Musc. Gall. 285, t. 80 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 652, fig. 325 (1894). DIX. JAMES. Stud. Handb. 353 (1896). CARDOT Monogr. 48 (1902).

*Hypnum antipyreticum* NECK. Meth. musc. 191 (1771).

*Fontinalis trifaria* VOIT Musc. Herbip. 125 (1812).

*Pilotrichum antipyreticum* C. MUELL. Synops. ii, 148 (1851).

Dioicous ; not glossy, in yellowish or olivaceous green floating tufts. Stems 10—20 in. long, repeatedly divided, irregularly fasciculate-branched, obtuse at points, naked at base, triquetrous-leaved. Leaves decurrent, broadly ovato-lanceolate, keeled and folded together, the line of keel curved, margin reflexed at base on one side, entire ; cells elongated rhomboido-hexagonal, larger and rectangular at basal angles, all incrassate. Perichæatial bracts large, broad and roundish, sheathing the capsule to the lid. Capsule ovate olive-green or brown, contracted below mouth when dry ; lid conic, teeth of peristome, when dry, loosely curled inward, purple, papillose, endostome blood-red, papillose, the transverse bars with 2—3 projecting appendages.

HAB.—Stones in rivulets and on wood by river banks. Fr. 6—7.

Var. *β. gigantea* Sulliv.

Plants very stout, not glossy, brownish-green or rufescent on one side, with few short branches. Leaves crowded, indistinctly trifarious, broad, ovate, obtuse, the margin slightly recurved at base on both sides, not auricled.

SYN.—*Fontinalis gigantea* SULL. in SULL. & LESQ. Musc. boreali Amer. exs. no. 224.

*Fontinalis Eatoni* SULL. l.c. 224c.

*Fontinalis antipyretica* var. *gigantea* SULL. Icones musc. 106, t. 66 (1864). LIMPR. Laubm. ii, 655.

*Fontinalis antipyretica* var. *robusta* CARDOT in Rev. bry. 1882, p. 88.

HAB.—Stream below Gordale scar, Yorkshire (*Prof. Barker*). Millersdale and Cheedale, Derbyshire (*Holt*). Near Aber, N. Wales (*Dixon*).

Var.  $\gamma$ . *cymbifolia* *Nicholson*. Journ. Bot. 1901, p. 427.

Stems long and floating, hardly shining. Leaves only slightly triquetrous at tips of growing shoots, soft, rather distant, shorter than in the type, oval concave, indistinctly carinate, not auricled, obtuse at point, margins erect, cells shorter and wider than in the type, rhomboidal.

HAB.—In the Thames at Kew (*F. Y. Brocas*) Herb. Cardot. In the Ouse near Lewes, Sussex (*W. E. Nicholson* 1900). Ouse at Hemingford Grey, Huntingdonshire (*Dixon* 1901)!!

M. Cardot considers that the European specimens of the var.  $\beta$  differ from the American, and belong to his var. *robusta*. Limpricht, on the other hand, unites the two under the var. *gigantea*. Many other varieties are described by authors.

## 2. *FONTINALIS GRACILIS* Lindb.

Dioicous; slender, leafless at base, branches parallel with the stem, pointed. Leaves incumbent, ovato-lanceolate, decurrent with flat margins, mostly split along the keel. Capsule immersed up to the lid, longish oval, bracts rounded. (T. CXXIII, A.)

SYN.—*Fontinalis gracilis* LINDB. in Hedwigia vi, 39 (1867), et in Not. ur Saells. Faun. Fl. fenn. foerh. ix, 274 (1868). MILDE Bry. Siles. 276 (1869). JURATZ. Laubm. fl. Oester.-Ung. 355 (1882). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 658 (1894).

*Fontinalis subglobosa* WILS. MS. (1869).

*Fontinalis antipyretica* var. *gracilis* SCHIMP. Synops. 2 ed. 552 (1876). CARDOT in Monog. des Font. 56 (1892).

Dioicous; plants slender, 10—15 in. long, leafless at base, light or dark green, glossy, the branches parallel with the stem, acutely pointed. Leaves close erecto-patent or laxly incumbent, from a broad decurrent base, ovato-lanceolate, rather obtuse, sharply keeled, concave with flat margins, mostly split along the straight keel; cells narrow, about 8 times long as wide, elongated rhomboidal at apex, 2—3 stratose and orange at base, at angles larger, brownish, quadrato-hexagonal, inflated. Perichætia mostly towards base of stem, bracts appressed, rounded, reaching to the lid, the cells vermiform and rhombic; capsule small, longish oval, narrowed below mouth, sometimes ventricose on one side, reddish-brown; lid obtusely conic. Teeth of peristome when dry geniculate and incurved, brownish-purple, lanceolate-subulate, united in pairs at point, not fenestrate,

finely papillose, endostome purple, forming a latticed cone, slightly papillose, the transverse bars faintly nodulose.

HAB.—On stones and rocks in alpine streams. Fr. 6—7.

Noran water, Forfarshire (*M. Anderson* 1869)!! Belquhan burn, near Kippen, Stirlingshire (*Col. Stirling and R. Kidston* June 1896)!! richly in fruit. Corrie Moy, Loch Laggan (*Prof. Barker* 1881)!!

This moss has such a very distinct facies and other characters, that I have preferred to maintain its specific rank, although most authorities combine it with the preceding species.

### 3. *FONTINALIS DOLOSA* Cardot.

Dioicous; pinnate, the branches flexuose. Leaves soft, erecto-patent, dimorphous; cauline ovato-lanceolate, branch-leaves narrower, lanceolate, flat, denticulate at apex. Capsule half immersed, small; endostome muricate, cross bars with two erect appendages. (T. CXXIII, D.)

SYN.—*Fontinalis dolosa* CARDOT Rev. bryol. 1896, p. 68. DIX. JAM. Stud. Handb. 355 (1896). LIMPR. Laubm. iii, 802 (1903).

Dioicous; plants soft, yellowish-green above, ferruginous below, slightly glossy. Stems 6—10 in. long, naked at base, strongly flexuose, pinnate, the branches unequal flexuose and patulous, attenuate-cuspidate. Leaves rather soft lax erecto-patent, imbricated at apex of branches, dimorphous; cauline ovato-lanceolate, obtusely or subacutely acuminate, denticulate at apex, more or less carinate and complicate, often split when old; branch-leaves smaller and narrower, nearly plane, lightly plicate, elongate-lanceolate, acutely toothed at apex. Cells at angles distinct, subhexagonal or shortly oblong, fuscous, the rest linear-flexuose. Perichætium ovate, the upper bracts suborbicular,  $\frac{2}{3}$  the length of capsule, finally truncate-lacerate; capsule half-emergent, small oblong; lid short, conical; peristome purple, the teeth narrow, internally with 25—30 lamellæ, endostome muricate, the cross-bars with two larger erect appendages.

HAB.—On wood submersed in a stagnant pool, Limbury, Bedford (*J. Saunders* 1882).

This fine species is near *F. Kindbergii* REN. & CARD. and *F. thulensis* JENS. from Iceland; I think it is quite distinct, especially in the armature of the endostome.

### 4. *FONTINALIS SQUAMOSA* L.

Dioicous; dark green, glossy, branches incumbent, fasciculate. Leaves oblong-lanceolate, concave, rather obtuse, inflexed at margin, cells linear, elongated, subrectangular at intervals. (T. CXXIII, C.)

SYN.—*Fontinalis squamosa tenuis sericea, atro-virens* DILL. Hist. musc. 258, t. 33, f. 3 (1741) et Herbar.

*Fontinalis squamosa* L. Sp. pl. ii, 1108 (1753). HUDS. Fl. angl. 398 (1762). WITHER. Bot. arrang. ii, 692 (1776). LIGHTF. Fl. Scot. ii, 696 (1777). ROTH Tent. fl. germ. iii, P. 2,

262 (1800). HEDW. Musc. frond. iii, 32, t. 12 (1792), Sp. musc. 299 (1801). SWARTZ Musc. succ. 72 (1799). BRID. musc. rec. II, P. III, 160 (1803), Sp. musc. III, 108 (1817), Mant. 181 (1819), Bry. univ. ii, 657 (1827). SMITH. Fl. Brit. 1336 (1804), Eng. Bot. t. 1861. TURN. Musc. hib. 199 (1804). WEB. MOHR. Bot. Tasch. 376 (1807). WAHLEN. Fl. Lapp. 382 (1812). ROEHL. Deutsch. fl. iii, 122 (1813). SCHWAEGL. Suppl. I, P. II, 307 (1816). HOOK. TAYL. Musc. br. 82 (1818). FUNCK Moost. 68, t. 53 (1821). GRAY Nat. arrang. i, 749 (1821). HUEBEN. Musc. germ. 701 (1833). DE NOT. Syllab. 2 (1838), Epilogo 61 (1869). BR. SCH. Bry. Eur. fasc. 16, t. 3 (1842). RABENH. D. kr. fl. II, S. 3, 154 (1848). WILS. Bry. Brit. 424 (1855). SCHIMP. Synops. 456 (1860), 2 ed. 554. BERK. Handb. 63, t. 3 (1863). MILDE Bry. Siles. 276 (1869). HOBK. Synops. 185 (1873). JURATZ. Laub. Oester.-Ung. 356 (1882). BOULAY Musc. Fr. 190 (1884). HUSN. Musc. gall. 286, t. 80 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 666 (1894). DIX. JAMES. Stud. Handb. 355 (1896). CARDOT Monogr. 80.

*Hypnum squamosum* NECK. Meth. musc. 192 (1771).

*Pilotrichum squamosum* C. MUELL. Synops. ii, 149 (1850).

*Fontinalis arduennensis* GRAVET in PIRÈ Nouv. rech. bry. fasc. iv. (1871).

Dioicous; dark green or black-green, glossy. Stem 10—16 in. long, naked at lower part; branches fasciculate incumbent, subulate at points. Leaves 3-ranked, incumbent, slightly decurrent and somewhat auricled at base, longish lanceolate, canaliculate-concave, rather obtuse with flat entire margins; cells chlorophyllose, linear, straight, 10—12 times long as broad, the basal yellow, and at angles inflated, oval and brownish. Perichæatial bracts circular, apiculate, reaching mouth of capsule, lacerate when old; capsule oval, yellowish brown, the lid emergent, conical, pointed. Peristome purple, the teeth papillose, endostome with coarse scattered papillæ.

HAB.—Moorland streams, not uncommon. Fr. 7.

Var. *β. Curnowii* CARDOT Monogr. 84.

Rather soft, yellowish-green, the stems elongated, branches elongated, with few ramuli; leaves rather distant, erecto-patent. Perichæatial bracts abruptly apiculate; capsule quite immersed.

HAB.—Penzance (*Curnow* 1865)!! Taxal, Derby (*Rogers*, 1878). Given in Rabenhorst's Bryotheca, no. 926.

### 5. *FONTINALIS DALECARLICA* Schimp.

Dioicous; resembling *F. squamosa* but more slender, not glossy, with filiform branches. Leaves narrow, lanceolate, concave, involute at margin. Capsule immersed, endostome smooth with narrow fragile cross-bars. (T. CXXXIII, B.)

SYN.—*Fontinalis squamosa* L. herb. sec. Schimper.

*Fontinalis dalecarlica* SCHIMP. Bry. Eur. fasc. 31, suppl. (1846). Synops. 457 (1860), 2 ed. 554. LESQ. JAMES MOSS. N. Amer. 270 (1884). CARDOT Monogr. 80 (1892). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 669 (1894).

*Pilotrichum dalecarlicum* C. MUELL. Synops. ii, 149 (1850).

*Fontinalis squamosa* var. *dalecarlica* HUSN. Musc. Gall. 287, t. 80 (1892).



Dioicous ; habit of *F. squamosa* but more slender, dark green, brownish at base, not glossy. Stem 8—16 in. long, very slender, naked at base, with numerous incumbent acuminate branches. Leaves laxly imbricated, decurrent, not auricled, lanceolate, gradually acute pointed, involute at margin, entire or with 2—3 teeth at apex ; cells at angles lax, long hexagono-rectangular, the rest very narrow and long. Perichæatial bracts appressed overtopping the capsule, acute, cells narrow, orange at base ; capsule immersed, longish ovate, castaneous, lid short, conic obtuse orange, teeth of peristome connivent, orange fenestrate in the middle, endostome yellowish, smooth, the cross-bars slender imperfect in the middle.

HAB.—Near Princeton, Dartmoor, sterile (Dixon 1894) !!

In the absence of fruit it is scarcely possible to separate this from *F. squamosa*. The leaves however are narrower and involute at margin, the upper perichæatial bracts apiculate and reaching beyond the mouth of capsule. The endostome is so thin and fragile, that I have failed to see a perfect example, and have copied fig. 8 from Husnot's plate. Mr. Dixon sent me a specimen, and I quite agree with him that it looks identical with *F. squamosa*, but it is sterile.

#### 6. *FONTINALIS DIXONI* Cardot.

Lurid green, glossy, subpinnate ; branches flexuose, cuspidate. Leaves erecto-patent, ovato-lanceolate ; cells at angles large and inflated, forming auricles. (T. CXXII, C.)

SYN.—*Fontinalis Dixoni* CARDOT Rev. bryol. 1896, p. 70. DIX. JAMES. Stud. Handb. 356 (1896). LIMPR. Laubm. iii, 802 (1903).

Plants lurid green or dark brown, glossy. Stems 3—6 in. long, not naked at base, flexuose, irregularly branched or subpinnate above, the branches flexuose, curved, cuspidate. Leaves firm, erecto-patent, imbricated at apex of branches, concave, ovato-lanceolate, gradually narrowed into an entire acute or bluntish point ; branch-leaves often much smaller but similar to the cauline. Cells at basal angles large inflated, ovate-oblong or subhexagonal, pellucid yellowish or fuscous, forming very distinct auricles, the rest very longly narrow linear, flexuose, the walls thickish, the primordial utricle indistinct. The rest unknown.

HAB.—River Colwyn, Beddgelert, N. Wales (*Dixon* 1888). A pretty shining moss, the green colour more or less mixed with rufous.

#### 7. *FONTINALIS SERIATA* Lindb.

Dioicous ; very slender, dingy green below, yellowish-green above. Leaves decurrent, narrowly lanceolate, gradually acuminate ; cells linear, rectangular at angles, orange and not forming auricles. (T. CXXIII, E.)



SYN.—*Fontinalis seriata* LINDB. in Act. Soc. pro Fauna et Flora fenn. 1881. Bot. Notis. 1882, p. 26. Rev. bryol. 1882, p. 85. CARDOT Monogr. 107 (1892). LIMPR. Laubm. ii. 669 (1894). DIX. JAMES. Stud. Handb. 357 (1896).

*Fontinalis dalecarlica* var. *seriata* KINDB. Laubm. Schwed. & Norw. 51 (1883).

Dioicous ; very slender, dingy green below, bright green and glossy at apex. Stems 4—6 in. long, very slender, branches few, parallel with stem. Leaves of equal size, trifarious, when dry laxly appressed, when moist erecto-patent, decurrent but not auricled at base, narrowly lanceolate, gradually acuminate, not keeled, slightly concave with flat margins, not toothed at apex. Cells linear, not serpentine, a few marginal rows narrower, those of base thick-walled, orange, at angles wider, about 12 in three rows, oval and rectangular, yellowish.

HAB.—In the Wye, Winforton, Herefordshire (*Binstead* 1895)!!

The nearest ally of this moss is *F. hypnoides* HARTM., from which it differs by the narrow erect leaves and firmer tissue.

Sect. 3. CRYPHÆÆ. Fertile branches with leaves equal on all sides, obscure or rather glossy, the cells dense, small, oval or rounded.

## 7. ANTITRICHIA *Brid.*

Mantissa 136 (1819).

Robust laxly tufted mosses, growing on trees and rocks. Main stem creeping filiform, the secondary irregularly pinnate. Leaves in many rows, ovate or lanceolate, nerve strong, cells incrassate in the middle in straight rows, narrow linear-rhombic, at base near the margin small, in oblique rows, elliptic, oval or hexagono-rotundate. Capsule elevated, regular, longish oval ; calyptra cucullate, teeth lanceolate, 16 ; endostome of 16 filiform processes, as long as teeth and alternating with them.—Der. *αντι* opposite, *θηξ* cilia—erroneous, as they alternate.

A small genus with 5 species, but a very natural one. The name contradicts nature, as the processes occupy their usual position.

### ANTITRICHIA CURTIPENDULA (*Hed.*) *Brid.*

Dioicous ; in lax robust dull green tufts. Stems vaguely branched, rigid ; leaves imbricated, rather squarrose, ovate-acuminate, serrulate towards apex, irregularly sulcate ; nerve vanishing below apex, with 1 or 2 shorter ones on each side ; cells oblong, obliquely serrate. (T.CXXIV, A.)

SYN.—*Hypnum arboreum repens, capitulis reflexis, brevibus pediculis insidentibus* DILL. Cat. Giss. 220 (1718), et in RAY Synops. 3 ed. p. 89 (1724).

*Hypnum dentatum curtispendulum, viticulis rigidis* DILL. Hist. musc. 333, t. 43, f. 69 (1741) et Herb.

*Hypnum curtipendulum* L. Sp. plant. 1128 (1753). HUDSON Fl. angl. 426 (1762). WEISS Crypt. Goett. 248 (1770). NECK. Meth. musc. 177 (1771). WITHER. Bot. arrang. ii, 687 (1776). WEBER Spic. Fl. Goett. 77 (1778). HOFFM. Deutsch. fl. ii, 66 (1795).

*Neckera hamulosa* VILLARS Cat. meth. 42 (1786).

*Neckera curtipendula* TIMM Prodr. fl. megap. 221 (1788). HEDW. Fund. II, 93 (1782), Sp. musc. 209 (1801). ROTH Fl. Germ. i, 462 (1788). SWARTZ Musc. Succ. 71 (1799). BRID. Musc. rec. II, P. II, 16 (1801), Sp. musc. II, 28 (1812). SM. Fl. Brit. 1275 (1804), Eng. Bot. t. 1444. TURN. Musc. Hib. 104 (1804). SCHULTZ Prod. fl. Starg. 307 (1806). WEB. MOHR Bot. Tasch. 241 (1807). WAHLEN. Fl. Lapp. 366 (1812). ROEHL. Deutsch. fl. iii, 83 (1813). SCHWAEGL. Suppl. I. P. II, 151 (1816). FUNCK Moost. 53, t. 34 (1821). C. MUELL. Synops. ii, 115 (1851).

*Anomodon curtipendulus* HOOK. TAYL. Musc. Brit. 79 (1818). GRAY Nat. arrang. i, 748 (1821). HUEBEN. Musc. germ. 565 (1833). DE NOT. Syllab. 77 (1838). RABENH. D. kr. fl. II, S. 3, 250 (1848).

*Antitrichia curtipendula* BRID. Mant. 136 (1819), Bry. univ. ii, 222 (1827). BR. SCH. Bry. Eur. fasc. 44—45 (1850). WILS. Bry. Brit. 316 (1855). SCHIMP. Synops. 476 (1860), 2 ed. 576. BERK. Handb. 148, t. 13 (1863). MILDE Bry. Siles. 286 (1869). DE NOT. Epilogo 216 (1869). HOBK. Synops. 140 (1873). JURATZ. Laubm. Oester.-Ung. 370 (1882). BOULAY Musc. Fr. 177 (1884). LESQ. JAMES MOSS. N. Amer. 291 (1884). HUSN. Musc. gall. 295, t. 84 (1892). DIX. JAMES. Stud. Handb. 369 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 688, f. 331 (1894).

*Cyrtopus curtipendulus* SPRUCE Musc. Pyren. no. 113 et Ann. and Mag. nat. hist. 1849, p. 151.

Dioicous; prostrate or pendulous, in laxly interwoven brownish-green tufts; the secondary stems much elongated, irregularly pinnate. Leaves crowded, patent, imbricated when dry, ovato-lanceolate with long points, irregularly plicate, broadly revolute at margin which is serrate in the point and terminating in two recurved teeth, distinct in the young leaves but generally lost in the old ones; nerve strong, ending below the point, and with 1—2 short faint ones on each side; cells along the middle elongated, towards the margin roundish-hexagonal. Perichætium long and sheathing, the bracts imbricated, the inner lanceolate with long subulate points, nerveless. Seta short, purple, smooth and flexuose; capsule cernuous, elliptic, reddish-brown; lid convex-conic, rostellate; teeth of peristome lanceolate-subulate, yellowish, not perforated; processes of endostome without basal membrane, subulate, long as teeth.

HAB.—On trees and rocks in subalpine districts. Fr. 4—5.

Wistman's wood, Dartmoor, plentiful!!

Var. *β. Californica* SULLIV.

Plants more slender, the branches often flagelliform; leaves densely imbricated, broader, only slightly serrulate, the sulci and lateral nerves obsolete.

SYN.—*Antitrichia californica* SULLIV. in Trans. Amer. Phil. Soc. xiii, 11 (1863). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 690.

*Ant. curtipendula β. hispanica* SCHIMP. Coroll. 109 (1856).

HAB.—On a tiled roof at Balcombe, Sussex (*Mitten* 1849)!!

This fine moss is remarkable for the two hooked teeth which terminate the leaves, and are no doubt intended to hold the long branches together, for in the old leaves they are generally broken off by the action of the wind.

8. *LEUCODON* *Schwaeg.*

Suppl. I, P. II, p. 1 (1816).

Laxly tufted mosses growing on rocks or the bark of trees. Main stem creeping, radiculose, secondary erect or ascending, julaceous, incurved, nearly simple, often with descending stolons near the base. Leaves densely imbricated in many rows, nerveless, with many longitudinal plaits, entire, appressed when dry, divergent when moist; the cells incrassate, at margin of lower part roundish quadrate, in the middle and apex elongated. Perichæatial bracts sheathing erect; capsule regular, immersed or exserted, calyptra cucullate, reaching below the capsule and clasping the seta, lid conical; teeth of peristome 16, lanceolate, papillose, split along the middle, endostome a narrow membrane or none.—Der. λευκος, white; οδους, a tooth.

Paris enumerates 46 species of this genus, which is remarkable in that the two strata of the peristome teeth are separated, and divided into chambers by transverse partitions.

**LEUCODON SCIUIROIDES (L.) Schwaeg.**

Dioicous; in lax dingy green tufts. Leaves imbricated, ovato-acuminate subsecund, plicato-striate. Capsule elliptic-oblong, lid conic rostellate; teeth of peristome cleft in the middle. (T. CXXIV, B.)

SYN.—*Muscus terrestris major nigricans, arborum truncis adnascens* RAY Synops. 2 ed. 39 (1696).

*Muscus repens serici modo lucens, viticulis longioribus erectis* op. cit. app. 338.

*Hypnum trichoides erectum, ramulis recurvis, obscuri coloris* DILL. in RAY Synops. 3 ed. 83 (1724).

*Hypnum arboreum sciuiroides* DILL. Hist. musc. 319, t. 41, f. 54 (1741), et Herbar.

*Hypnum sciuiroides* L. Sp. pl. 1130 (1753). HUDS. Fl. Angl. 429 (1762). WEISS Crypt. goet. 258 (1770). NECK. Meth. musc. 175 (1771). WITHER. Bot. arrang. ii, 689 (1776). LIGHTF. Fl. Scot. ii, 764 (1777). RELH. Fl. Cant. 417 (1785). HOFFM. Deutsch. fl. ii, 67 (1795).

*Fuscina sciuiroides* SCHRANK Baiers. fl. ii, 452 (1789). ROEHL. Deutsch. fl. iii, 64 (1813).

*Fissidens sciuiroides* HEDW. Fund. II, 91, t. 8 (1782), Sp. musc. 161 (1801). ROTH Fl. germ. i, 460 (1788). BRID. Musc. rec. II, P. I, 153 (1798). ROEHL. Moosg. D. 311 (1800). SCHULTZ Fl. Starg. 293 (1806). WAHLENB. Fl. Lapp. 335 (1812), Fl. Carpat. 342 (1814).

*Dicranum sciuiroides* SIBTH. Fl. Oxon. 280 (1794). SWARTZ Musc. Succ. 32 (1799). SM. Fl. Brit. 1215 (1804), Eng. Bot. t. 1903.

*Pterogonium sciuiroides* TURN. Musc. hib. 32 (1804).

*Cecalophum sciuiroides* P. BEAUV. Prodr. 51 (1805), Mem. Soc. Linn. Par. i, 442 (1822).

*Pterigynandrum sciuiroides* BRID. Sp. Musc. I, 134 (1806).

*Trichostomum sciuiroides* WEB. MOHR Bot. Tasch. 132 (1807).

*Leucodon sciuiroides* SCHWÆG. Suppl. I, P. II, p. 1 (1816) et II, P. I, 82, t. 125 (1823). HOOK TAYL. Musc. Brit. 63, t. 20 (1818). BRID. Mant. 134 (1819), Bry. univ. ii, 208 (1827). GRAY Nat. arrang. i, 741 (1821). HUEBEN. Musc. germ. 549 (1833). DE NOT.

Syllab. 79 (1838), *Epilogo* 221 (1869). RABENH. D. kr. fl. II, S. 3, 301 (1848). BR. SCH. Bry. Eur. fasc. 44—45 (1850). WILS. Bry. Brit. 313, t. 20 (1855). SCHIMP. Synops. 475 (1860), 2 ed. 574. BERK. Handb. 150, t. 13 (1863). MILDE Bry. Siles. 285 (1869). HOBK. Synops. 139 (1873). JURATZ. Laubm. Oest-Ung. 368 (1882). LESQ. JAMES Moss. N. Amer. 288 (1884). BOULAY Musc. Fr. 179 (1884). HUSN. Musc. Gall. 293, t. 83 (1892). DIX. JAMES. Stud. Handb. 366 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 684, f. 330 (1894).

*Neckera (Euleucodon) sciuroides* C. MUELL. Synops. ii, 107 (1850).

Dioicous; growing in lax dingy green tufts. Secondary stems ascending, incurved when dry, simple or with a few branches. Leaves densely crowded, imbricated, spreading, erect when dry, cordate acuminate acute, 4—6 plicate, nerveless, entire; cells incrassate, roundish-quadrate, elongated in the middle. Perichæatial bracts long and sheathing, not plicate; seta reddish, capsule erect, oval-oblong, castaneous; lid conical, annulus in two rows, calyptra longer than capsule; teeth of peristome pale erect, lineal-lanceolate, cleft in the median line, papillose, with compartments internally, endostome abortive.

HAB.—Trunks of trees, rocks and walls, not uncommon. Fr. 11, rare.

Walls at Gaythorne Hall, Westmoreland c. fr. (*Stabler* 1872)!! New Forest (*Lyll*). Henfield (*Borrer*). Wharfedale (*Nowell*).

Var. *β. Morensis* (*Schwaeg.*) *De Not.* Syllab. 79.

Larger and more robust, leaves larger, denser, and more elongated; capsule larger, cylindric, endostome more developed.

SYN.—*Leucodon morensis* SCHWÆG. Suppl. I, P. II, p. 2, et II, P. I, p. 82, t. 125. BRID. Bry. univ. ii, 210. WILSON, SCHIMPER, etc.

*Neckera sciuroides β. cylindricarpa* C. MUELL. Synop. ii, 108.

HAB.—Berkshire (*Herb. Turner*). Dorking (*Woods*). Craig-an-lochan, Ben Lawers (*Waterfall* 1885)!! Clova (*Fergusson*).

### 9. CRYPHÆA *Web. Mohr*.

Weber Tab. synopt. musc. (1803).

Growing on trunks of trees. Stem creeping, the secondary erect and simple. Leaves octofarious, divergent, imbricated when dry, ovate-acuminate, nerved, not plicate; cells incrassate, round or oval. Capsules on one side, immersed in the elongated perichæatium, ovate; calyptra conico-campanulate, often papillose; lid conic or rostellate; peristome of 16 linear-lanceolate teeth, endostome 16 lanceolate-subulate processes.—Der. *κρυφαίος*, concealed.

Over 80 species are referred to this pretty genus, most of them being tropical. In leaf structure it is closely allied to *Hedwigia*.

#### CLAVIS TO THE SPECIES.

Autoicous, leaves ovato-acuminate acute. Per. bracts entire, calyptra conic. *arborea*,  
Dioicous, leaves broadly ovate obtuse. Per. bracts serrulate, calyptra dimidiate. *Lamyi*.



1. **CRYPHÆA ARBOREA** (*Huds.*) *Lindb.*

Autoicous ; sparingly branched. Leaves broadly ovate, acutely pointed ; entire, nerve ending below apex. Perich. bracts elliptic-oblong with an excurrent nerve ; capsules unilateral, immersed oblong ; lid conico-acuminate. (T. CXXIV, C.)

SYN.—*Sphagnum heteromallum, polycephalum* DILL. Hist. musc. 248, t. 42, f. 6 (1741) et Herb.

*Sphagnum arboreum* HUDS. Fl. Angl. 396 (1762). L. Sp. Plant. 2 ed. 1570 (1763). WITHER. Bot. arrang. ii, 659 (1776).

*Hypnum polycephalum* NECK. Meth. musc. 190 (1771).

? *Phascum repens* WITHER. Bot. arrang. ii, 661 (1776).

*Fontinalis secunda* L. Fil. Meth. musc. 368 (1787).

? *Grimmia arborea* SCHRANK Baier. fl. ii, 445 (1789).

*Hypnum heteromallum* GMEL. Syst. nat. 1340 (1791).

*Neckera heteromalla* HEDW. Musc. frond. iii, 38, t. 15 (1792), Sp. musc. 202 (1801). SIBTH. Fl. Oxon. 304 (1794). SM. Fl. Brit. 1274 (1804), Eng. Bot. t. 1180. TURN. Musc. Hib. 102 (1804). SCHWAG. Suppl. I, P. II, 146 (1816). HUEBEN. Musc. Germ. 572 (1833).

*Cryphaea heteromalla* MOHR Tab. synop. musc. (1803). BRID. Mant. 139 (1819), Bry. univ. ii, 250 (1827). RABENH. D. kr. fl. II, s. 3, 243 (1848). BR. SCH. Bry. Eur. fasc. 44—45 (1850). WILS. Bry. Brit. 420 (1855). SCHIMP. Synops. 463 (1860), 2 ed. 561. BERK. Handb. 65, t. 3 (1863). MILDE Bry. Siles. 280 (1869). DE NOT. Epilogo 218 (1869). HOBK. Synops. 184 (1873). JURATZ. Laubm. Oester-Ung. 359 (1882). BOULAY Musc. Fr. 179 (1884). HUSN. Musc. Gall. 288, t. 81 (1892). DIX. JAMES. Stud. Handb. 358 (1896). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 680, f. 329 (1894).

*Pilotrichum arboreum* P. BEAUV. Prodr. 17 (1805).

*Daltonia heteromalla* HOOK. TAYL. Musc. Brit. 81 (1818). GRAY Nat. arrang. i, 749 (1821). DE NOT. Syllab. 71 (1838).

*Pilotrichum heteromallum* C. MUELL. Synops. ii, 167 (1851).

*Cryphaea arborea* LINDB. Bidrag till Moss. syn. 10 (1863).

Autoicous ; in lax creeping tufts. Secondary stems pinnate, with few branches. Leaves patent when moist, imbricated and appressed when dry ; ovate-acuminate, concave, margin entire, reflexed in lower half, nerve ending below apex ; cells incrassate, roundish, longish next the nerve at base, becoming oval in oblique rows towards margin. Perich. bracts entire, appressed, inner ovato-lanceolate, with a long excurrent nerve and a single row of small quadrate cells at margin ; capsules all turned to one side, on a very short seta ; immersed, ovate-oblong, reddish-brown ; calyptra small conico-campanulate, notched at margin smooth ; lid convex-conic, acute ; teeth of peristome whitish, lanceolate, fenestrate, endostome with 16 filiform processes as long as teeth, cilia none, all papillose.

HAB.—On old trees, most frequent in S. of England. Fr. 4—5.



2. **CRYPHÆA LAMYI** (*Montagne*) *Lindb.*

Dioicous; robust, stems elongated, incurved when dry. Leaves broad ovate, obtuse; perich. bracts tapering into a serrulate acumen; calyptra short conical papillose, cucullate. (T. CXXIV, D.)

SYN.—*Daltonia Lamyana* MONT. Ann. Sci. nat. 2 ser. vi, 327, t. 18 (1837).

*Cryphæa Lamyana* C. MUELL. Linnæa xviii, 680 (1844). HUSN. Musc. Gall. 437 (1894). CAMUS in Bull. de la Soc. bot. de France xli, p. cli (1894).

*Pilotrichum heteromallum* β. *aquatile* C. MUELL. Synops. ii, 168 (1851).

*Cryphæa heteromalla* var. *aquatilis* WILS. Bry. Br. 420 (1855). DE NOT. Epilogo 218 (1869).

*Cryphæa Lamyi* LINDB. in Meddel. af soc. pro Faun. Fl. fenn. 1881, no. 6, pp. 71—75.

*Cryphæa arborea* β. *Lamyana* BOUL. Musc. Fr. 188 (1884).

*Cryphæa heteromalla* β. *Lamyana* HUSN. Musc. gall. 289 (1892). LIMPR. Laubm. ii, 682 (1894), et iii, 804.

Dioicous; aquatic, much more robust, dingy green above, blackish below. Stem decumbent, 2—4 in. long, straight when submersed, arcuato-recurved when dry. Leaves imbricated when dry, horizontally patent when moist, broadly oval, concave, obtuse, narrowed a little towards point, entire and plane at margin; nerved for  $\frac{3}{4}$  their length; cells punctiform, arranged in parallel longitudinal rows, transversely oblique in the inner perichætil bracts. Perich. bracts serrulate above; outer oblong, lanceolate-acuminate, nerved nearly to apex; inner oval, nerveless; seta very short, capsules urceolate, shorter than in *arborea*, immersed, brown, in two rows; calyptra short, widely conical, papillose above, slit on one side, lower margin thin and lacerate; lid conical, recurvo-rostellate. Peristome shorter than in *C. arborea*.

HAB.—Submerged rocks in streams, sometimes on trunks of trees; rare.

On stones in the Dart above Hood Bridge, near Totness, Devon (*Rev. Mr. Toser*). Banks of the Taw, Devon (*Rev. C. A. Johns*).

This excellent species has by nearly all bryologists been considered a variety of *C. arborea*, yet the two differ in almost every particular, and no connecting forms have been met with. It was first found by M. Lamy de la Chapelle in 1836, near Limoges, in France, growing associated with *Cinclidotus* and *Grimmia rivularis*, and named after him by Montagne. Since that time its specific distinction has only been recognised by Lindberg and M. Camus, and by C. Mueller with doubt. In the admirable paper by M. Camus, the question is exhaustively treated, and, we should consider, authoritatively settled.

10. **HEDWIGIA** *Ehrh.*

Hannov. Mag. 1781, p. 1095.

Growing on rocks; stems dichotomous or irregularly branched, often stoloniferous, dense leaved; the leaves octofarious, imbricated when dry,

nerveless, papillose, the cells incrassate, quadrate towards margin, linear at base. Capsule immersed in the perichætium, or exserted, globose or oval, gymnostomous; calyptra small, conical; lid flat or conical or rostellate.—Der. After Dr. J. Hedwig, of Chemnitz.

This genus has been by most bryologists referred to the Grimmiaceæ, no doubt from a superficial resemblance to *G. apocarpa*, of which Linnæus and some of the older botanists made it a variety. It is, however, clearly pleurocarpous, and with *Braunia*, *Harrisonia*, *Dendropogon*, etc., closely allied to *Cryphaea*.

SECT. I. HEDWIGIDIUM (*Br. Sch.*) Mitt. Stem nearly simple, flagelliferous; capsule immersed, plicate, calyptra cleft on one side.

### I. HEDWIGIA IMBERBIS (*Sm.*) Spruce.

Autoicous; leaves ovato-lanceolate, more or less plicate, yellowish-green; perichætial bracts elongated, erose at apex; capsule subglobose, nearly exserted; calyptra obliquely cucullate. (T. CXXIV, F.)

SYN.—*Gymnostomum imberbe* SM. Eng. Bot. t. 2237 (1810).

*Hedwigia integrifolia* P. BEAUV. Prodr. 60 (1805).

*Anictangium imberbe* HOOK. TAYL. Musc. Brit. 14 t. 6 (1818). GRAY Nat. arrang. i, 713 (1821).

*Schistidium imberbe* NEES HORNB. Bry. Germ. i, 29, t. 8 (1823).

*Anictangium ciliatum* var. *rufescens* W. ARN. Disp. meth. 11 (1825).

*Schistidium ciliatum* β. *imberbe* HUEBEN. Musc. germ. 31 (1833).

*Hedwigidium imberbe* BR. SCH. Bry. Eur. fasc. 29—30, p. 3, t. 1 (1846). WILS. Bry. Brit. 148, t. 6 (1855). SCHIMP. Synops. 239 (1860), 2 ed. 284. BERK. Handb. 244, t. 21 (1863). DE NOT. Epilogo 717 (1869). HOBK. Synop. 77 (1873). BOULAY Musc. Fr. 397 (1884). HUSN. Musc. Gall. 143, t. 41 (1887). DIX. JAMES. Stud. Handb. 239 (1896). LIMPR. in RABEN. D. kr. fl. Laubm. iii, 822, f. 210 (1889).

*Hedwigia imberbis* SPRUCE Musc. Pyren. no. 538, Ann. Mag. of Nat. Hist. 1849, p. 187. MITT. Musc. Ind. or. 124 (1859).

*Neckera imberbis* C. MUELL. Synops. ii, 105 (1851).

Autoicous; growing in lax yellowish-green patches, stems 1—3 inches long, with few irregular branches and divergent small-leaved runners. Leaves imbricated when dry, divergent when moist, decurrent, ovato-lanceolate, green faintly plicate, margin recurved; cells on both sides, with a central papilla, incrassate, rectangular at base, passing to linear in the centre and quadrate at margin, above shorter with a marginal row quadrate. Leaves of the stolons very small, distant appressed and ovate at base, suddenly contracted into a long recurved filiform point. Perichætial bracts larger, distinctly plicate, with long eroso-serrate points.

Capsule on a pedicel as long as capsule, erect, obovate, reddish-brown; lid obliquely rostellate, yellow; calyptra cucullate, annulus none.

HAB.—Inclined faces of rocks, not common. Fr. 10—11.

Near Glengarriff, Ireland (*Miss Hutchins*)!! Dolbadarn Castle, about Snowdon, near Beddgelert and Llanrwst, N. Wales (*Wilson*). Near Loch Awe, Argyllshire (*Dr. Stirton*)!!

SECT. 2. EUHEDWIGIA *Mitt.* Mosses growing in cushioned tufts. Leaves imbricated; whitish-piliferous at apex.

## 2. HEDWIGIA ALBICANS (*Web.*) *Lindb.*

Autoicous; leaves crowded, ovato-lanceolate, with diaphanous erose points, glaucous. Perich. bracts larger, ciliated at the diaphanous points. Capsule globose, immersed. (T. CXXIV, E.)

SYN.—*Sphagnum cauliferum et ramosum, saxatile, hirsutum, incanum, capitulis virentibus* DILL. Cat. Giss. 229 (1718), et in RAY Synops. 3 ed. 105 (1724).

*Sphagnum nodosum, hirsutum et incanum* DILL. Hist. musc. 246, t. 32, f. 5 (1741), et Herb.

*Bryum apocarpum* β. L. Sp. plant. 1115 (1753). WEISS Crypt. Goett. 180 (1770). NECK. Meth. musc. 199 (1771). WITH. Bot. arrang. ii, 670 (1776). LIGHTF. Fl. Scot. ii, 716 (1777).

*Fontinalis albicans* WEB. Spic. fl. Goett. 38 (1778). ROTH Tent. fl. Germ. i, 479 (1788).

*Bryum apocarpum incanum* EHRH. Hann. Mag. 1780, p. 236.

*Hedwigia apocarpa* LEYSS. Fl. Hall. no. 1049 (1783). ROTH Fl. Germ. i, 453.

*Hedwigia anodon* EHRH. Hann. Mag. 1781, p. 1095, Beitr. i, 172 (1787).

*Hedwigia ciliata* EHRH. Msc. HEDW. Descr. i, 104, t. 40 (1787). TIMM Fl. Megap. no. 722 (1788). BRID. Musc. rec. II, P. I, 31, t. 1, f. 3 (1798). ROEHL. Moosg. Deutsch. 52 (1800). RABENH. D. kr. fl. II, S. 3, 152 (1848). BR. SCH. Bry. Eur. fasc. 29—30 (1846). WILS. Bry. Brit. 146, t. 6 (1855). SCHIMP. Synops. 238 (1860), 2 ed. 283. BERK. Handb. 245, t. 21 (1863). DE NOT. Epilogo 717 (1869). MILDE Bry. Siles. 161 (1869). HOBK. Synops. 76 (1873). JURATZ. Laubm. Oesterr.-Ung. 184 (1882). LESQ. JAMES. Moss. N. Amer. 142 (1884). HUSN. Musc. Gall. 142, t. 41 (1887). DIX. JAMES. Stud. Handb. 160 (1896).

*Bryum sphagnoides* JACQ. Collec. ii, 222 (1788).

*Bryum ciliatum* GMEL. Syst. Nat. ii, 1331 (1791). DICKS. Pl. crypt. iv, 6 (1801).

*Gymnostomum Hedwigia* SCHRANK Fl. Salisb. no. 818 (1792). HOFFM. Deutsch. fl. ii, 28 (1795). WEB. MOHR. Bot. Tasch. 78 (1807).

*Gymnostomum ciliatum* SWARTZ Musc. Suec. 19 (1799). SM. Fl. Brit. 1168 (1804), Eng. Bot. t. 1179.

*Anictangium ciliatum* HEDW. Sp. musc. 40 (1801). TURN. Musc. Hib. II (1804). SCHULTZ Fl. Starg. 277 (1806). BRID. Sp. musc. I, 22 (1806). ROEHL. Ann. Wetter. Gesell. ii, 199 (1811), Deutsch fl. iii, 46 (1813). SCHWAEGL. Suppl. I, P. I, 38 (1811), Voit Musc. herbip. 13 (1812). WAHLENB. Fl. Lapp. 304 (1812), Fl. Carpat. 334 (1814), Fl. Upsal. 390 (1820). HOOK. TAYL. Musc. Brit. 14, t. 6 (1818). FUNCK Moost. 7, t. 5 (1821). GRAY Nat. art. i, 713 (1821).

*Hedwigia diaphana* P. BEAUV. Prodr. 60 (1805).

*Schistidium ciliatum* BRID. Mant. 21 (1819), Bry. univ. i, 116 (1826). NEES HORNB. Bry. Germ. i, 101, t. 8, f. 5 (1823). HUEBEN. Musc. Germ. 30 (1833). DE NOT. Syllab. 277 (1838).

*Pilotrichum ciliatum* C. MUELL. Syn. ii, 164 (1851).

*Hedwigia albicans* LINDB. Musc. Scand. 40 (1879). BOULAY Musc. Fr. 396 (1884). LIMPR. in RABEN. D. kr. fl. Laubm. i, 820, f. 209 (1889).

Autoicous; growing in depressed hoary yellowish-green patches. Stems irregularly divided, procumbent and ascending, leafless at base. Leaves erect and imbricated when dry, spreading on all sides or secund when moist, somewhat decurrent, ovato-lanceolate with diaphanous erose points, concave, not plicate, revolute at margin, papillose. Cells on both sides from centre of cell set with 2—3 pointed papillæ, narrow and linear in middle of base, quadrate at sides and above. Perichæatial bracts longer, acuminate, the upper margin fringed with long white flexuose nodulose cilia. Capsule immersed, obovate or globose, on a very short seta, erect, pale brown, reddish at mouth; calyptra conical with a long point; lid plano-convex, generally with a central papilla.

HAB.—On rocks in mountainous places, frequent. Fr. 3.

Var. *β. leucophæa* Br. Sch.

More robust and densely leaved; leaves broader, whitish, a third part void of chlorophyl.

HAB.—In very dry places.

Var. *γ. secunda* Br. Sch.

Stems long and slender, prostrate, leaves secund, less crowded, with a shorter acumen, or submuticous.

*Schistidium imberbe* BRID. Bry. univ. i, 118 (excl. syn.).

HAB.—Shady rocks.

Var. *δ. viridis* Br. Sch.

More slender, leaves dark green with the apex scarcely colourless.

HAB.—Shady rocks.

Var. *ε. striata* Wils.

Leaves sulcate, reflexed at margin, yellow-green; lid of capsule convex-conic.

SYN.—*Anictangium striatum* WILS. in HOOK. Brit. Fl. ii, 12 (1833).

HAB.—Granite rock near Llyn Idwel, Caernarvonshire (*Wilson*). Alva wood, Ochill hills (*Lyle*). New Galloway (*McAndrew*).

TAB. CXX. A. *Porotrichum alopecurum* (Whitby, Braithwaite). B. *Por. angustifolium* (Derbyshire, Holt). C. *Homalia trichomanoides* (Knowle Park, Braithwaite). D. *Neckera complanata* (Killarney, Braithwaite).

TAB. CXXI. A. *Neckera crispa* (Dartmoor, Holmes). B. *N. fontinaloides* (Sussex, Davies). *β. var. Philippii* (Callander, McKimlay). C. *N. pennata* (Colin Glen, Orr). D. *Climacium dendroides* (Cheshire, Whitehead).

TAB. CXXII. A. *Alsia Smithii* (Sussex, Davies). B. *Fontinalis antipyretica* (Stroûd, G. Holmes). *β. var. gigantea*. C. *F. Dixoni* (Beddgelert, Dixon).

TAB. CXXIII. A. *F. gracilis* (Stirlingshire, Kidston). B. *F. Dalecarlica* (Princeton, Dixon). C. *F. squamosa* (Hebden Bridge, Wilson). D. *F. dolosa* (Limbury, Saunders). E. *F. seriata* (Winforton, Binstead).

TAB. CXXIV. A. *Antitrichia curtipendula* (Dartmoor, Holmes). B. *Leucodon sauroides* (Levens, Stabler). C. *Cryphæa arborea* (Shanklin, Braithwaite). D. *Cr. Lamyi* (River Dart, Toser). E. *Hedwigia albicans* (Craigailleach, Braithwaite). F. *Hed. imberbis* (Wales, Wilson).

a. Fertile pl. b. Male pl. c. Sterile pl. i. Stem leaf. i a. Apex. i b. Base. i r. Branch leaf. 2. Perich. bract. 3. Male infl. 4. Bract. and Antherid. pc. Perichætium. 5. Capsule. 6. Calyptra. 8. Part of Peristome.







## SUPPLEMENT.

### CATHARINEA TENELLA *Roehling.*

Dioicous ; in lax tufts with short simple stems. Leaves oblong-lanceolate, not undulate, spinose at margin, nerve with 2—4 lamellæ. Capsule suberect, oblong ; lid long as capsule, rostrate. (T. CXXV, A.)

SYN.—*Catharinea tenella* ROEHL. Ann. Wetter. ges. iii, 234 (1814). BRID. Bry. univ. i, 104 (1827). C. MUELL. Synops. i, 194 (1849). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 598 (1893). SALMON in Journ. Bot. 1898, p. 465, t. 393.

*Mnium orthorrhynchum* BRID. Sp. musc. iii, 45 (1817).

*Polytrichum undulatum*  $\beta$ , minus FUNCK Moost. 70 (1820).

*Bryum Polla orthorrhyncha* BRID. Bry. univ. i, 691 (1826).

*Atrichum tenellum* BR. SCH. Bry. Eur. fasc. 21—22, p. 9, t. 4 (1844). SCHIMP. Synops. 435 (1860), 2 ed. 529. MILDE Bry. Siles. 246 (1869). JURATZ. Laubm. Oester-Ung. 340 (1882). BOULAY Musc. Franc. 204 (1884). HUSNOT Musc. Gall. 276, t. 77 (1890).

Dioicous ; in lax tufts  $\frac{1}{2}$ —1 in. high ; the stems simple. Leaves dull yellowish-green, soft, erecto-patent, crisped when dry, oblong-lanceolate, smooth at back or with a few scattered spinules, scarcely undulate, margin spinose in upper, the teeth single or in pairs, sometimes nearly obsolete, nerve with 2—4 low lamellæ frequently interrupted ; cells hexagono-rotundate, basal rectangular. Seta yellowish, capsule suberect, cernuous when ripe, oblong and urn-shaped, yellowish-brown ; calyptra reaching below the capsule, nearly smooth ; lid as long as capsule, reddish-brown, shining, hemispherical, rostrate. Peristome large, teeth finely papillose.

HAB.—Sandy turf by roadsides and in woods, very rare. Fr. 8—10. Bedgbury wood, Goudhurst, Kent, mixed with *C. angustata* (Sir J. Stirling, W. E. Nicholson, and E. S. Salmon, 1898)!!

This moss is very close to *C. undulata* var. *minor*, and as both vary considerably in size and other characters, it is probable the present species has been overlooked and referred to the latter. Mr. Salmon has admirably dealt with the subject in his paper quoted.

*Catharinea angustata* BRID.

Bedgbury wood, Goudhurst, Kent, by sandy roadside, intermixed with the last. Chobham Common, Surrey, with fine fruit (*E. F. Shepherd*, May 1903)!!

FISSIDENS (§ OCTODICERAS) JULIANUS (*Savi*) Schimp.

Autoicous; growing in water, in lax dark green tufts. Leaves distant, long and narrow, sword-shaped, not bordered. Capsule small, erect; calyptra conical; teeth of peristome short, irregularly truncate. (T. CXXV, C.)

SYN.—*Muscus pinnatus, aquaticus, ramosissimus, Linariae foliis* MICHEL Gen. pl. 114 (1728).

*Schistophyllum fontanum* LA PYL. in DESV. Journ. Bot. 1813, p. 52, t. 34, f. 2.

*Fontinalis Juliana* SAVI Bot. etrusc. iii, 107 (1818), et in POLLIN. Fl. Veron. iii, 385 (1824).

*Octodicerus Julianus* BRID. Bry. univ. ii, 678 (1827). BR. SCH. Bry. Eur. fasc. 17 (1842). LIMPR. in RABENH. D. kr. fl. Laubm. i, 457, fig. 145 (1887). DUNCAN in Journ. Bot. 1902, p. 51, t. 430.

*Fissidens debilis* SCHWAEGL. Suppl. I, P. II, p. 11 (1816).

*Conomitrium Julianum* MONT. Annal. sc. nat. 1837, p. 246, t. 4. SCHIMP. Corollar. 21 (1855), Synops. 111 (1860), 2 ed. 122. DE NOT. Syllab. 87 (1838), Epilogo 474. SCHWAEGL. Suppl. IV, t. 313 (1842). BOULAY Musc. Fr. 531 (1884). HUSNOT Musc. Gall. 53, t. 16 (1884).

*Fissidens Julianus* SCHIMP. in Flora 1838, P. I, p. 271. C. MUELL. Synops. i, 44 (1849).

*Octodicerus fontanum* LINDB. Bidrag. Moss. Synon. 23 (1863).

*Schistophyllum Julianum* LINDB. Musc. Scand. 13 (1879).

Autoicous; growing in water in lax dark green tufts, stems very slender, 2—4 in. long, the leaves distant, patent, long lineal, entire, not limbate, the nerve vanishing below the apex, the superior lamina about 3 times the length of the vaginant part, and the inferior not reaching the base; cells rounded-hexagonal. Fruit on a short axillar branch, seta short and fleshy, calyptra conical, capsule small, erect, goblet-shaped, lid long and conical, rostrate teeth irregular and imperfect. Male infl. gemmiform, axillar, without paraphyses.

HAB.—On stones and wood in streams. Fr. 4—6, rare.

In the Severn at Bewdley and near Stourport, and for an extent of 13 miles (*Mr. J. B. Duncan* 1901)!! sterile.

This elegant moss differs in no way from the genus *Fissidens* except in its aquatic habit and imperfectly developed peristome. The fruit, when mature, drops out of the vaginula and floats away, or sinks to the bottom.

DITRICHUM VAGINANS (*Sull.*) Hampe.

Dioicous; in small dense tufts. Leaves stiff, erect, from a longish ovate base gradually tapering to a point, nerved to apex. Capsule erect, cylindric, lid conical. (T. CXXV, E.)

SYN.—*Trichostomum vaginans* SULLIV. Musc. Alleg. no. 176 (1846). SULLIV. LESQ. Musc. bor. amer. no. 154 p.p.

*Leptotrichum homomallum*  $\beta$ . *strictum* SCHIMP. Synops. 144 (1860).

*Leptotrichum avimontanum* SCHIMP. in Sched.

*Ditrichum vaginans* HAMPE in Flora 1867, p. 182. LIMPR. in RABEN. D. kr. fl. Laubm. i, 499, f. 155 (1887). DAVIES in Irish Nat. 1901, p. 164.

*Didymodon tenuis* SENDT. MILDE Bry. Siles. 135.

*Aongstromia Lamyi* BOUL. Musc. de l'Est 553 (1872).

*Leptotrichum vaginans* SCHIMP. Syn. 2 ed. 140 (1876), excl.  $\beta$ . HUSN. Musc. gall. 62, t. 18 (1884).

*Ditrichum lineare* (Sw.) LINDB. in Sched.

Dioicous; about  $\frac{1}{2}$  in. high, in small dense yellow-green tufts. Plants slender, erect. Leaves stiff, erect, from a longish ovate base, gradually sharp-pointed, almost tubular at apex from the involute margin, nerve strong, ending in the point, excurrent in the perichætal bracts, margin above curved, entire or obsoletely denticulate at apex; cells smooth, rectangular, elongated at base. Perich. bracts sheathing, subulate at points; seta reddish, capsule erect, longish cylindric, pale brown, lid conical, teeth of peristome of two unequal legs, often more or less united, papillose.

HAB.—On sandy earth or clay, very rare. Fr. 10.

Turfy ground on Colin mountain, Co. Antrim, Ireland, sterile (*J. H. Davies* 1901)!!

This insignificant little moss is found scattered in the mountain districts of Germany, Bavaria, and the Tyrol, but seldom in fruit.

### DITRICHUM ZONATUM (*Brid.*)

In dense tufts, glossy yellow-green above, transversely banded alternately with dark and yellowish-brown below. Stem slender and brittle, with few branches. Leaves stiff, erect, appressed when dry, short, from a longish ovate base gradually pointed, channelled above, the margin not incurved; cells rectangular and quadrate. Fruit unknown.

Thus Limpricht describes our plant, and also separates another species as *Ditrichum nivale* (C. MUELL.) to which belong the synonyms *Leptotrichum nivale* C. M., *L. vaginans* var.  $\beta$ . *glaciale* SCHIMP., and *L. tenue*  $\beta$ . *glaciale* SCHIMP., and the fruiting plant. It is found at the Unter Aar glacier and Morteratsch glacier in Switzerland.

Dixon has a var. *scabrifolium*, with leaves densely papillose on both sides, Journ. Bot. 1902, p. 378, summit of Ben Laoigh (*Dixon*, 1901), and Ben Chalum (1898). Ben Lomond (*Mrs. Graham*).

*Seligeria tristicha* BRID. in SCHRAD. Journ. i, 44 (1800), has precedence of *S. trifaria* (*Weisia*) in the same work, ii, 283 (1801).

*Blindia trichodes* (WILS.) LINDB. is referred by Limpricht to *B. acuta* as var. *Seligeri* BRID. Mant. p. 59 (1819).

CAMPYLOPUS SCHWARZII *Schimp.*

Var.  $\beta$ . *Hunti* (*Stirton*).

*Campylopus Hunti* STIRTON Ann. Scott. nat. hist. 1899, p. 106.

Plants very slender, 1—2 in. high. Leaves secund, with smaller auricles, cells at base lax and hyaline, larger, quadrate and rectangular, with 10—12 rows at the margin very narrow and elongated; nerve narrower at base.

HAB.—Summit of Snowdon (*Hunt* 1865).

This moss differs considerably in appearance from *C. Schwarzii*, and is of softer texture, but in structure it agrees so closely with it that it can scarcely be maintained as a species.

*Campylopus subulatus* var. *elongatus* (BOSWELL).

Prof. Barker has found this with fruit, on rocks in the R. Lugwey at Pont-y-Pair, N. Wales, in 1899.

The fruit of *C. atrovirens* has also been found by Fourcade below the Cascade de Sidonie, Vallée de Burbe, Pyrenees. It is quite like that of *C. flexuosus*.

CAMPYLOPUS ATROVIRENS *De Not.*

Var.  $\epsilon$ . *gracilis* *Dixon*, Journ. Bot. 1902, p. 374.

Plants very slender, 1—2½ in. high, bright or yellowish-green above, yellowish-brown below, densely tufted, sparingly radiculose. Leaves long, much narrower, with a very slender arista, cells of upper half of lamina rhomboid, with thin walls.

HAB.—Glen Phée 1868 and Broadford, Skye (*Fergusson*). Lake district 1870 and Loch Coruisk, Skye, 1881 (*Prof. Barker*). Cader Idris (*Weyman* 1893). Moel-yr-Ogof, Carnarvonshire (*Jones* 1898). Cwm Idwal and Clogwyn-du-ar-ben-y-Glyder (*Jones* 1899). Cwm Bychan 1899 and Tulsarnau, Merioneth 1901 (*Jones and Dixon*).

CAMPYLOPUS FLEXUOSUS (*L.*) *Brid.*

Var.  $\delta$ . *zonatus* (MOL.) *Limpr.* Laubm. i, 391.

SYN.—*Campylopus zonatus* MOLENDI in sched. (1860), Bayerns Laubm. p. 53 (1875).

*Campylopus flexuosus*  $\beta$  *major* BOUL. Musc. Fr. 511 (1884).

Stems 2—4 in. high, with red tomentum. Leaves secund, with large auricles of large purple cells; lamina below of 20—24 cell-rows, above the cells are irregular and oblique.

HAB.—Moor near Carlaway, Island of Lewis (*Braithwaite* 1900).

*Campylopus brevipilus* Bry. Eur. has been found with fruit in 1895 by Jørgensen on Stord Island, Norway.

*Campylopus atrovirens* var. *muticus* MILDE in Bot. Zeit. 1870, p. 396, precedes my name *epilosus* in vol. i, 298.



16. DICRANUM STRICTUM *Schleicher*.

Dioicous; in short yellowish tufts. Leaves fragile, and generally broken off in the upper part, lanceolate-subulate, entire, auricled at base. Capsule cylindraceous, lid rostrate. (T. CXXV, D.)

SYN.—*Dicranum strictum* SCHLEICH. Crypt. Helv. Cent. III, 26 (1806). SCHWAEGL. Suppl. I, P. I, 188, t. 43 p.p. (1811). BRID. Mant. 67 (1819), Bry. univ. i, 459 (1826). FUNCK Moost. 30, t. 21 (1821). HUEBEN. Musc. germ. 247 (1833). BR. SCH. Bry. Eur. fasc. 37-40, p. 28, t. 19 (1847). C. MUELL. Synops. i, 376 (1849). SCHIMP. Synops. 81 (1860), 2 ed. 82. DE NOT. Epilogo 629 (1869). JURATZ. Laubm. Oester.-Ung. 40 (1882). BOUL. Musc. Fr. 541 (1884). HUSN. Musc. Gall. 29, t. 9 (1884). LIMPR. in RABEN. D. kr. fl. Laubm. i, 367 (1886). DIX. JAMES. Stud. handb. 112 (1896).

Dioicous; in stiff yellowish-green tufts, slightly glossy,  $\frac{1}{2}$ —1 in. high, radiculose. Leaves erecto-patent, stiff and fragile, lanceolate-subulate and deeply channelled above, the nerve longly excurrent, margin entire; angular cells inflated orange, rectangular, becoming smaller and quadrate upward. Perichæatial bracts sheathing suddenly subulate above middle; seta yellow; capsule erect or cernuous, narrow and cylindric, pale yellowish, lid subulate-rostrate,  $\frac{1}{2}$  length of capsule; teeth of peristome narrow, orange.

HAB.—On rotten wood and trees, rare and sterile.

On decayed rails, Blithfield Park near Abbots Bromley, Stafford (*Bloxam* 1864)!! Near Ingestre, Stafford (*Dr. Fraser* 1866). Stone wall, Alton Towers, and on trees near Admaston, Stafford (*Bagnall* 1895). Hampton Lovett and Droitwich, Worcester. Roslyn wood near Edinburgh. Priory Park, Hawkesyard, Stafford (*Rev. H. P. Reader*).

This plant must replace *D. viride*, vol. i, p. 156, which is unknown as a British moss, but specimens of the Abbots Bromley plant were sent by Hunt to Lindberg, who named them *D. viride* in a paper sent to the Linnean Society (Journ. Linn. Soc. Bot. xi, 466). At that time I had no specimen, except a foreign one, of *D. viride*, and this was figured, but Mr. Bagnall has sent me some of *Bloxam's* plant which I now figure, and he has also found it in several other localities.

*Dicranum undulatum* has been found near Holme-on-Spalding Moor, Yorks. (*J. Marshall* 1896), and at Callow Hill, Virginia Water (*E. F. Shepherd* 1900).

## ONCOPHORUS POLYCARPUS.

Var. *laxiretis* *Dixon*.

SYN.—*Cynodontium polycarpum* var. *laxirete* *DIXON* Handb. 73.  
*O. polycarpoides* *STIRTON* Ann. Scott. nat. hist. 1902, p. 107.

Leaves longer and broader, upper cells 3—4 times as large as in the type, quite smooth, more regularly quadrate, margin entire except at apex; capsule cylindric, with a longer neck, swollen at base of capsule equally all round, when dry and empty the capsule is very long and narrowing gradually down from the wide mouth.

HAB.—On a wall in Glen Lyon, Perthshire (*Dixon* 1893).

*Ceratodon purpureus* var. *obtusifolius* *MILDE*. LIMPR. Laubm. i, 487.

Stems elongated, 2—3 in. high. Leaves obtusely pointed, the nerve vanishing below apex.

HAB.—Foot of a willow tree, bank of the Kelvin below Kirkintilloch (*Kidston* 1897)!!



EPHEMERUM STELLATUM *Philib.*

Dioicous ; plants minute, simple and scattered. Leaves numerous, spreading from an oval base, linear acute, entire, cells at base large hexagonal, with a round swelling on both surfaces. Capsules oval, pointed. (T. CXXV, F.)

SYN.—*Ephemerum stellatum* PHILIBERT in Rev. Bryol. 1879, p. 62. BOULAY Musc. Fr. 577 (1884). HUSN. Musc. gall. 208, t. 56 (1884). LIMPR. in Rabenh. D. kr. fl. Laubm. iii, 634 (1901). NICHOLSON in Journ. Bot. 1902, p. 337, t. 442 (1902).

Dioicous ; the plants very small, simple and isolated as in *E. serratum*. Leaves about 20, squarrosely divergent, stiff, plane and straight, oval at base, suddenly linear, acute, nerveless, entire ; cells at base hexagonal, with a thick round swelling, convex on both surfaces and filled with opaque granules, the upper much longer than broad. Capsule oval or globose, orange-brown, pointed at apex, rather smaller than that of *E. serratum*. Calyptra campanulate, covering  $\frac{3}{4}$  of capsule, with 2—3 slits at base ; spores smooth, smaller than those of *E. serratum*.

HAB.—Damp clay soil, very rare. Fr. 10—11.

Bedgbury woods, Kent, with *E. serratum* 1901, and Crowborough, Sussex, 1902 (*W. E. Nicholson, Esq.*).

This elegant little moss is quite distinct from *E. serratum* and of much firmer substance, the leaves also are of a different shape. The large circular swelling on a number of the basal cells is most unusual and a striking feature of the plant. Bridel has a *Phasus stellatum* sent by Green from Shrewsbury—Mant. musc. 4, et Bry. univ. i, 24—described as having a stout nerve, and probably a form of *P. acaulon*.

POTTIA COMMUTATA *Limpr.*

Paroicous ; leaves longish oval, margin recurved narrowly above, nerve excurrent in a short recurved point, cells thickly papillose. Capsule cernuous, longish oval, calyptra papillose, lid obtusely conic with a small boss ; peristome yellowish, the teeth very short, obtuse, of 2—3 joints. (T. CXXV, B.)

SYN.—*Pottia commutata* LIMPR. in Raben. D. kr. fl. Laubm. i, 537, fig. 160 (1888).

Paroicous ; resembling *P. Starkei*, growing gregariously, light green. Upper leaves longish oval with a short point, margin narrowly recurved above, nerve orange, excurrent in a short recurved point ; cells above hexagonal, thickly papillose, below rectangular and smooth. Perich. bracts elliptic, seta yellow curved. Capsule cernuous, longish oval, castaneous, slightly plicate when the lid has fallen ; calyptra yellowish papillose, lid obtusely conic with a blunt central boss ; peristome pale yellow, the teeth very short, and of 2—3 joints, papillose and often perforated ; spores strongly papillose.

HAB.—Clay soil in calcareous districts, very rare. Fr. 12—1.

Near Seaford, Sussex (*W. J. Nicholson* 1903), also near Rottingdean and Newhaven.

Closely resembling some forms of *P. Starkii* or *Davallii*. The capsule is very large for the size of the plant.

*Pottia Davallii* (SMITH) LINDB.

See ante vol. i, 201, is generally regarded as a species, and it is on account of being quite gymnostomous that it must hold this position. This group of small mosses has such a close resemblance in the vegetative organs, that it is difficult to decide the question of specific value.

### TORTULA (§ DESMATODON) CERNUA (*Hueben.*) *Lindb.*

Autoicous; stems short, densely tufted. Leaves oblongo-lanceolate cuspidate, erecto-patent, entire, nerve excurrent. Capsule cernuous, ovato-globose, gibbous; lid conic with a short point. (T. CXXXVI, C.)

SYN.—*Cynodontium latifolium* SCHWAEGL. Suppl. I, P. I, 110, t. 28 (1811).

*Didymodon latifolius* WAHLEN. Fl. lapp. 313, t. 20 (1812).

*Cynodon latifolius* WEB. MOHR. Bot. Tasch. 154 (1807). BRID. Mant. 99 (1819), Bry. univ. i, 502 (1826).

*Dermatodon cernuus* HUEBEN. Musc. germ. 117 (1833).

*Anacalypta inclinata* NEES Msc. SENDTNER.

*Desmatodon inclinatus* SENDT. in Regens. Denksch. iii, 143 (1841).

*Desmatodon cernuus* BR. SCH. Bry. Eur. fasc. 18—20, p. 8, t. 5 (1843). SCHIMP. Synops. 160 (1860), 2 ed. 186. DE NOT. Epilogo 572 (1869). JURATZ. Laubm. fl. Oest.-Ung. 130 (1882). HUSNOT Musc. gall. 94, t. 26 (1885). LIMPR. in RABENH. D. kr. fl. Laubm. i, 652 (1888).

*Trichostomum inclinatum* C. MUELL. Syn. i, 593 (1849).

*Trichostomum cernuum* LINDB. De Tort. 225 (1864). MILDE Bry. siles. 100 (1869).

*Tortula cernua* LINDB. Musc. scand. 20 (1879).

Autoicous; densely tufted,  $\frac{1}{2}$ —1 in. high, green above, fuscous below. Leaves erecto-patent, a little twisted when dry, lower small, upper crowded, lineal spatulate, acutely pointed, keeled, margin revolute in lower half, flat and obsoletely serrate above, crenulate with geminate pupillæ, nerve rufous, excurrent in an acute point, cells hexagonal, minute and chlorophyllose above, oblongo-hexagonal and inflated below, those of limb elongate, in 2—3 rows. Seta yellow, capsule cernuous or horizontal, yellowish-brown, short, ovate gibbous; lid small conic, shortly pointed, annulus pluriseriate. Teeth of peristome 16, cleft into 2—3 filiform or partly cohering legs, rufous, papillose. Spores large, tuberculate.

HAB.—Damp walls and clefts of rocks in sub-alpine places; very rare. Fr. 9.

Wall at Barwick near Aberford, Yorkshire (*G. Webster* 1900)!!

A very distinct moss, with a remarkably small capsule not unlike that of *Catocopium*.

TORTULA (§ ZYGOTRICHIA) INERMIS (*Brid.*) *Mont.*

Autoicous ; resembling *T. subulata*. Leaves more solid, lower oblong-lanceolate, upper lineal-elongate, muticous or with a very short apiculus, margin reflexed, not limbate. Capsule narrowly cylindraceous, subarcuate. (T. CXXVI, D.)

SYN.—*Syntrichia subulata* var. *inermis* BRID. Bry. univ. i, 581 (1826).

*Tortula inermis* MONTAGNE in Archiv. Bot. i, 136, t. 4 (1832). LIMPR. in RABENH. D. kr. fl. Laubm. i, 675 (1888).

*Syntrichia subulata* ♂ *mutica* HUEBEN. Musc. germ. 335 (1833).

*Barbula subulata* γ *inermis* BR. SCH. Bry. Eur. fasc. 13—15, p. 37, t. 22 (1842).

*Tortula subulata* β *inermis* SPRUCE in ANN. Mag. Nat. Hist. 2 ser. iii, 376 (1849).

*Barbula inermis* C. MUELL. Synops. i, 624 (1849). SCHIMP. Bry. Eur. fasc. 46—47, t. suppl. 3 (1851). Coroll. Br. eur. 33 (1855). Synops. 187 (1860), 2 ed. 224.

*Desmatodon inermis* MITT. Musc. Ind. orien. 37 (1859).

Autoicous ; near *T. subulata*, densely tufted, olivaceous-green or brown. Leaves dense, firm, erect, when dry folded together and incurved, lower oblong-lanceolate, upper lineal-elongate, obtuse, very shortly apiculate, margin not limbate, entire, revolute, nerve rufous, ending in the point or shortly excurrent, it and lamina papillose on both sides ; cells smaller above than in *T. subulata*, opaque, roundish hexagonal and quadrate below, rectangular and hyaline at base. Seta long, brown ; capsule narrowly cylindric, subarcuate, reddish-brown ; lid  $\frac{1}{3}$  length of capsule, conical, pointed, oblique ; annulus of 2—3 rows, tube of peristome  $\frac{1}{3}$  its length.

HAB.—Dry banks, clefts of rocks and walls ; very rare. Fr. 7.

Near Cowie Moss, Stirlingshire (*R. Kidston* and *Col. Stirling* 1895) 11

Vêy near to *T. subulata* and *angustata*, but the leaves are more solid, with smaller cells ; generally muticous, and without the border of narrow cells.

## MOLLIA (§ EUCLADIUM) ÆRUGINOSA.

Var. γ. *humilis* (*Ingham*).

*Weisia rupestris* var. *humilis* Ingham Journ. Bot. 1900, p. 495.

Very dwarf, compactly tufted. Leaves very narrow and acute, with pellucid areolation.

HAB.—Kilhope Burn, Wearhead, Durham (*Ingham* 1893).

MOLLIA (§ HYMENOSTOMUM) STERILIS (*Nicholson*).

Autoicous ; closely resembling *M. crispa*, but with denser comal leaves completely hiding the capsule: the long beak to the lid and the plane margined leaves are also characteristic. (T. CXXVI, A.)

SYN.—*Weisia sterilis* NICHOLSON in Journ. Bot. 1903, p. 247.

Autoicous ; resembling *Mollia crispa*, but in larger and laxer yellowish-green tufts. Stems branched, or rarely simple,  $\frac{1}{2}$ — $\frac{3}{4}$  in. high. Leaves small below, accrescent upward, lanceolate-acuminate, acute, strongly crisped when dry, the margins plane or slightly incurved ; nerve strong, excurrent in a minute apiculus ; cells hyaline, incrassate, minutely papillose, elongated at base, roundish quadrate above. Perichæatial bracts resembling the stem-leaves, but broader and longer. Capsule immersed, on a very short seta, fuscous, nearly spherical or oval ; lid very small, indistinctly defined but acutely rostrate ; spores papillose. Male inflorescence gemmiform, close to the perichætium.

HAB.—Chalk downs in S. of England, rare. Fr. 2.

Between Lewes and Chichester, Sussex ; and at Reigate, Surrey (*W. E. Nicholson* 1900) !  
Folkestone, Kent (*H. N. Dixon*).

Mr. Nicholson kindly sent me the specimen figured, and I can confirm all the remarks in his paper ; the fruit, no doubt, is very infrequent, but this hardly justifies the specific name. I think it will be most convenient to maintain our four British and the foreign *M. Levieri* as distinct species, although closely allied.

### MOLLIA (§ HYMENOSTOMUM) CRISPATA (*Nees Horns.*)

Autoicous ; resembling *M. tortilis*. Leaves longer, lineal-lanceolate, curled when dry, involute at margin, nerve excurrent in a mucro. Capsule ovato-oblong, often gibbous, lid with a longer beak, peristome rudimentary. (T. CXXVI, E.)

SYN.—*Weissia fallax* SEHLMAYER in *Flora* ii, 639 (1818). BRID. Bry. univ. i, 336 (1826).

*Hymenostomum crispatum* NEES HORNSCH. Bry. Germ. i, 204, t. 12, fig. 7 (1823). BRID. Bry. univ. ii, 80 (1827). Bryol. Eur. fasc. 33—36, p. 6, t. 4 (1846). SCHIMP. Synops. 2 ed. 36 (1876).

*Weissia gymnostomoides* BRID. Bry. univ. i, 342 (1826). HUEBEN. Musc. Germ. 126 (1833).

*Weisia Rudolphiana* HORNSCH. in Bry. Germ. ii, 2, p. 31, t. 25 (1831).

*Weisia viridula* var. *gymnostomoides* Bry. Eur. l.c.

*Gymnostomum crispatum* SCHIMP. Synops. 36 (1860) p.p.

*Gymnostomum tortile* γ *alpinum* Schimp. Synops. 36 (1860).

*Gymnostomum Schimper* MOL. Moosstud. Alg. alpen 58 (1865).

*Mollia viridula* var. γ *gymnostomoides* LINDB. Musc. Scand. 21 (1879).

*Weisia crispata* C. MUELL. Synops. i, 662 (1849). JUR. Laubm. Oest.-Ung. II (1882). LIMPR. in RABEN. D. kr. fl. Laubm. i, 254 (1886). DIXON Journ. of Bot. 1899, p. 375.

Autoicous ; very like *M. tortilis*, growing in dense yellowish-green tufts. Leaves erecto-patent when moist, curved and hooked when dry, elongated, ovato-lanceolate, suddenly ending in a short point formed by the excurrent nerve, which is brown, and stouter than that of *M. tortilis*, margins in the upper part strongly involute, and nearly meeting in the middle : cells on both sides with low papillæ. Seta yellow, capsule erect ovate or elliptical, sometimes gibbous and cernuous, brownish ; lid with



a long oblique beak. Peristome rudimentary, the teeth scarce showing above the mouth of capsule, pale and thin, obtuse, composed of only 2—3 articulations, which are sometimes perforated.

HAB.—Crevices of limestone rocks ; not common. Fr. 4—5.

Westmoreland and Ingleton, Yorkshire (*Prof. Barker*). N.W. Lancashire (*Wheldon*). Derbyshire, Carnarvonshire (*D. A. Jones*). Wearhead, Durham, and Jackdaw crag quarry, Tadcaster (*Ingham 1898*)!!

The insignificant peristome has probably been often overlooked, and led to the belief that it was absent. It may be best observed before the lid separates, by soaking the capsule in water and then compressing it on a stage-plate, when the lid is forced off and the peristome is evident.

### BARBULA (§ EUBARBULA) CORDATA (*Juratz.*)

Dioicous ; growing in small brownish-green cushions. Stems simple or dichotomous. Leaves broadly ovato-lanceolate, cordate at base, carinate-concave, margin reflexed, nerve thick, reaching the point or excurrent, cells all minute. (T. CXXVI, B.)

SYN.—*Didymodon cordatus* JURATZ. Bot. Zeit. 1864 et 1866, p. 177. DE NOT. Epilogo 567 (1869). SCHIMP. Synops. 2 ed. 162 (1876). HUSNOT Musc. gall. 83, t. 23 (1885). LIMPR. in RABENH. D. kr. fl. Laubm. i, 551 (1888).

*Trichostomum cordatum* MILDE Bry. siles. 203 (1869).

Dioicous ; near *Barbula lurida*, but stouter, in short, lax, brownish-green tufts. Leaves erecto-patent, when dry incurved and appressed, from a broad cordate concave base, lanceolate, carinate, margin entire and revolute ; nerve very stout, ending in the point or excurrent ; cells above as in *B. lurida*, but less incrassate, roundish angular, more thickened in the middle, somewhat laxer and quadrate, or shortly rectangular at base ; in the axils a collection of brown oval two or more celled gemmæ.

HAB.—Old walls and rocks, rare.

Saunton cliffs, Braunton Burrows, N. Devon (*E. M. Holmes 1903*)!!

### BARBULA CURVIROSTRIS.

Var. *γ. insignis* Dixon. Journ. Bot. 1902, p. 377.

Robust, 3—5 in. high, in large tufts, dark or brownish-green above ; dark brown at base, stems densely tufted, often radiculose. Leaves long, lax, when dry divergent below, curled and incurved above, when moist widely spreading from an erect, somewhat sheathing base, gradually tapering to a subacute point ; cells rectangular and subquadrate, pellucid. Capsule narrowly elliptic, tapering into a distinct neck, dark brown, pachydermous.

HAB.—Wet alpine rocks.

Meall-nan-Tarmachan (*Dixon 1893*). Ben Laoigh (*Dixon and Binstead*). Acharn, Lochay bridge, Cam Creagh and Tyndrum. Glencoe and Ballachulish, Argyll. Inchnadamph, Sutherland.



## CINCLIDOTUS FONTINALOIDES.

Var. *β. pseudoaquaticus* Ingham. Journ. of Bot. 1900, p. 495.

Plants brown below, dark green above, with slender curved branches. Leaves rigid, narrow, tapering upward, acutely pointed, with a strong broad nerve.

HAB.—Wall by a waterfall at Hawes, Wensleydale (Ingham 1900)!!

## GRIMMIA ARENARIA Hampe.

Autoicous; in small hoary tufts. Leaves erecto-patent, narrowly lanceolate, with very long hair points; cells rectangular at base, minute and quadrate above. Capsule on a short curved seta, oval; lid short conical obtuse, teeth cribose. (T. CXXVI, F.)

SYN.—*Grimmia arenaria* HAMPE in LINNÆA x, 404 (1836). C. MUELL. Synops. i, 784 (1849). De NOT. Epilogo 705 (1869). BOUL. Musc. Fr. 383 (1884). HUSN. Musc. gall. 133, t. 38 (1887). LIMPR. in RABENH. D. kr. fl. Laubm. i, 735 (1889).

*Grimmia Zahlbruckneri* GAROV. Bry. Austr. 26 (1840).

*Grimmia curvula* BRUCH in lit. ad Schleicher (1834). BR. SCH. Bry. Eur. fasc. 25—28, p. 11, t. 3 (1845). SCHIMP. Synops. 207 (1860), 2 ed. 249.

Autoicous; plants short, crowded into hoary tufts, blackish at base. Leaves small and lanceolate at base, upper erecto-patent, lineal-lanceolate, hyaline at apex and running out into a long flexuose faintly serrated hair, margin flat, concave at base, carinate towards apex; cells quadrate above, rectangular and yellowish at base. Seta yellow, curved down so that the capsule is turned to one side among the leaf hairs; capsule small oval yellowish, longitudinally plicate when old; calyptra conical, mitriform; lid conical, obtusely pointed, annulus narrow, of two rows of cells; peristome yellow, the teeth irregular in form, obtuse and cleft at apex, papillose and perforated with one or two rows of small chinks in the upper half.

HAB.—On non-calcareous sub-alpine rocks, rare. Fr. 10—2.

Near Dolgelly (Prof. Barker 1898), and Capel Garmon, Denbigh, 1899. Penmaenpool near Dolgelly (Dixon 1901).

This pretty moss is very near to *G. Donii*, but may be at once recognised by the arcuate seta, the much longer hairs to the leaves, and shorter peristome.

## 19. GRIMMIA UNGERI Juratzka.

Autoicous; growing in dense cushions  $\frac{1}{2}$  in. high, dark olivaceous-green. Leaves lanceolate-acuminate, with a long smooth hair. Capsule erect oval, smooth; calyptra cucullate, lid conic, obtusely rostellate; teeth red, nearly entire. (T. XLIX, E.)

SYN.—*Grimmia Ungerii* JURATZ. in UNG. and KOTSCHY Die insel. Cypern 169 (1865). Laubm. Oester.-Ung. 167 (1882). HOBK. Synops. 83 (1873). SCHIMP. Synops. 2 ed. 853 (1876). LIMPR. in RABENH. D. kr. fl. Laubm. i, 781 (1889).

*Grimmia intermedia* FERG. in lit. BRAITHW. in Journ. Bot. 1872, p. 198.

*Grimmia alpestris* (non SCHLEICHER) CHALUBINSKI Grimm. Tatrenses 65, p.p. t. 9, f. 24—27 (1882). DIX. JAMES Stud. Handb. 146 (1896).

Autoicous ; in dense cushions  $\frac{1}{2}$  in. high, dark olivaceous-green above, black at base. Leaves erecto-appressed when dry, erecto-patent when moist ; accrescent upward, lowest from a longish ovate base, lanceolate, muticous, upper lanceolate, gradually acuminate, passing into a smooth hair  $\frac{1}{3}$ — $\frac{2}{3}$  length of lamina, margin plane, nerve prominent at back ; cells bistratose in upper part, opaque and roundish-quadrate, shortly rectangular at base, with 2—4 rows at margin quadrate and hyaline. Perich. bracts broader, elongated ; seta short, yellowish and thick ; capsule erect, scarcely elevated above the hair-points, oval, smooth, pachydermous, brown ; annulus not distinct, calyptra cucullate, lid conic, obtusely rostellate, reddish, teeth rufous, deeply inserted, papillose, entire or slightly cleft at apex.

HAB.—On earth in crevices of rocks, very rare. Fr. 6.

Near Ballater, Aberdeenshire (*Rev. J. Fergusson* 1870) !

This is generally admitted to be a species distinct from *alpestris*. Chalubinski's specimens were a mixture of the two.

### GRIMMIA HOMODICTYA Dixon.

Dioicous ? resembling *G. calyptrata* HOOK., growing in grey hoary tufts  $\frac{1}{2}$  in. high. Leaves crowded, erect and straight when dry, ovato-lanceolate, gradually tapering to a rather broad point, and terminating in a broad spinulose hair ; margins recurved, cells rectangular. (T. CXXVI, G.)

SYN.—*Grimmia homodictyon* DIXON in Rev. bryol. 1901, p. 12.

Dioicous ? resembling the American *G. calyptrata* HOOK., growing in low, grey, hairy tufts ; stems readily falling asunder,  $\frac{1}{2}$  in. high, with 2—3 branches, erect, straight, rather rigid. Leaves crowded, erecto-patent when moist, erect and straight when dry, ovato-lanceolate, gradually acuminate and terminating in a strongly spinulose hyaline hair, short in the lower leaves, longer in the upper, carinate concave, one or both margins recurved, with two layers of cells, one or two rows in upper part incrassate. Nerve yellowish, well-defined, convex and prominent at back. Cells shortly rectangular, more or less sinuose in the middle, smaller at apex, one to three rows at base narrow and elongated, marginal cells in 2—3 rows, quadrate or transversely elongated.

HAB.—On a block of limestone near Inchnadamph, Sutherland (*Nicholson, Salmon, and Dixon* 1899).

## WEISSIA PHYLLANTHA.

Var. *β. stricta* (NICHOLSON).

SYN.—*Ulota phyllantha* var. *stricta* NICHOLSON Journ. Bot. 1900, p. 134.

Stems elongated, rather more branched. Leaves straight, erect, only slightly crisped when dry; nerve ceasing below apex, and without gemmæ.

HAB.—Rocks by the sea, I. of Stroma, Pentland Frith (*Dr. Mason*).

TETRAPLONDON WORMSKJOLDII (*Hornem.*) *Lindb.*

Autoicous; very slender, tall and branched. Leaves distant, oval or obovate, obtusely acuminate, concave, nerve vanishing below the point. Capsule oval, on a large obconic hypophysis; lid small, convex, teeth 16, columella immersed. (T. CXXVII, A.)

SYN.—*Splachnum Wormskjoldii* HORNEM. in Fl. Danica, x, p. 8, t. 1659 (1819). SCHWÆG. Suppl. II, P. I, 27, t. 108 (1823). BR. SCH. Bry. Eur. fasc. 23–24, p. 7, t. 4 (1844). C. MUELL. Synops. i, 143 (1849). SCHIMP. Synops. 306 (1860), 2 ed. 367.

*Aplodon Wormskjoldii* R. BROWN Suppl. to Parry's Voy. 299 (1824).

*Eremodon Wormskjoldii* BRID. Bry. univ. i, 237 (1826).

*Tetraplodon* (§ *Haplodon*) *Wormskjoldii* LINDB. Musc. Scand. 19 (1879). LINPR. in RABENH. D. kr. fl. Laubm. ii, 164 (1891). JONES & HORRELL in Journ. Bot. 1902, p. 49, t. 430.

Autoicous; stems very slender, 1–5 in. high, densely rufo-radiculose, dichotomously branched. Leaves obovate, with a long or shorter apiculus, very soft, entire; nerve slender, vanishing below the apiculus; cells lax, large, rectangular and rhomboidal. Capsule on a slender yellowish seta, small, urceolate, brownish, the hypophysis longer, obconic, blackish-brown, corrugated when old; lid conical, flattened; columella immersed, peristome of 16 equidistant solid yellow entire teeth. Male infl. numerous on elongated nearly naked branches, fuscous, the bracts sheathing at base, oval, with a long obtuse reflexed acumen.

HAB.—Watery places on elevated moorlands, very rare. Fr. 4–5.

Wet hollow on Widdy Bank Fell, Teesdale, Durham (*M. B. Slater* 1870)!! *D. A. Jones* and *E. C. Horrell* (1901)!!

This elegant and unexpected addition to our flora—probably a relic of the last glacial period—was first found at Godhaab in Greenland, afterwards at Melville Island and Spitzbergen, and later in Lapland, Norway, and Sweden, where it is not rare. Mr. Slater referred the plant to a bad state of *T. bryoides*, and it was not until the appearance of the paper in the *Journal of Botany* that he found out his mistake. It varies remarkably in size, no doubt in accordance with the variable humidity of the season.

## LEPTOBRYUM PYRIFORME.

Var.  $\beta$ . *minus* (Phil.) Husnot.

Smaller in all its parts. Capsule shorter, the peristome pale and short, with incomplete cilia.

SYN.—*Leptobryum minus* PHILIBERT Musc. Gall. no. 768.

*Leptobryum pyriforme*  $\beta$  *minus* HUSN. Musc. Gall. 221 (1888). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 216.

HAB.—Wet flat in Coatham Marshes, Yorkshire (*W. Ingham*, July 1900)!!

BRYUM ARCTICUM (*R. Br.*) *Br. Sch.*

Synicous; in small yellowish-green tufts, tinged with red. Leaves oval acuminate, with an excurrent nerve, margin narrowly limbate revolute. Capsule pendulous, oval-pyriform, pale brown; lid small, conical, with a point. (T. CXXVII, C.)

SYN.—*Pohlia arctica* R. BR. in Suppl. to Parry's Voy. 197 (1824), Flora vii, Beil. 118 (1825). SCHWAEGL. Suppl. III, P. II, t. 272 (1829).

*Hemisynapsium arcticum* BRID. Bry. univ. i, 606 (1826).

*Bryum arcticum* BR. SCH. Bry. Eur. fasc. 32, Suppl. p. 2, t. 2 (1846). C. MUELL. Synops. i, 269 (1849). SCHIMP. Synops. 345 (1860), 2 ed. 409. MILDE Bry. Siles. 205 (1869). JURATZ. Laubm. Oest.-Ung. 260 (1882). LESQ. JAMES MOSS. N. Amer. 224 (1884). BOULAY Musc. Fr. 277 (1884). HUSN. Musc. Gall. 234, t. 63 (1889). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 297, fig. 276 (1892). DIXON in Journ. Bot. 1900, p. 331.

Synicous; in small yellowish-green tufts, more or less tinged with vinous red. Lower leaves distant lanceolate, upper comant, oval acuminate, pointed with the excurrent, toothed reddish nerve, margin revolute, with a limb of 2—3 rows of brown narrow cells; cells shortly rectangular at base, rhombic above. Capsule clavato-pyriform, slightly curved, pale brown, pendulous; lid orange, conical with a point; teeth of peristome finely punctuate, orange, hyaline towards points; endostome orange, with two short cilia.

HAB.—On humus in clefts of alpine rocks, very rare. Fr. 8.

On the ground, summit of Craig Chailleadh, Perthshire (*Dixon* 1898), and on Ben Lawers in 1900.

Mr. Dixon kindly lent me his drawings of these three fine species of *Bryum*, and, as he uses a higher amplification, the leaf-cells are larger in proportion to my own figures.

BRYUM LAWERSIANUM *Philib.*

Synicous; in small, dull green tufts. Leaves oval acuminate, mucronate with the excurrent nerve, margin with a border of 5—6 rows of very long, narrow cells; areolation rhomboid; capsule oval, with a long neck; lid small, convex. (T. CXXVII, D.)

SYN.—*Bryum Lawersianum* PHILIBERT Rev. bryol. 1899, p. 99. DIXON in Journ. Bot. 1900, p. 331.



Synicous ; resembling *B. arcticum*, but more scattered, in small dull green tufts, blackish at base, radiculose. Leaves at base broadly oval or suborbicular, acute and plane at margin ; comal leaves much less acuminate, recurved at apex, mucronate with the excurrent nerve, uppermost lanceolate, the margin with a limb of 5—6 rows of very long narrow cells ; areolation firm, close and opaque, the cells rhomboid ; capsule regular, oval, pendent, brown ; lid small, convex, with a small acute mamilla ; teeth of peristome gradually acuminate, orange, papillose in upper  $\frac{1}{3}$ , the ventral surface hyaline, of many close joints without accessory partitions ; endostome adherent.

HAB.—On the bare ground, on mountains, very rare.

Ben Lawers (*Dixon*), 1900.

### BRYUM MAMILLATUM *Lindb.*

Autoicous ; in low dense tufts. Leaves crowded, oblongo-lanceolate, margin revolute, with a yellow border of 4 rows of long narrow cells, nerve excurrent in a denticulate point. Capsule pendulous, turgidly pyriform, lid mamillar. (T. CXXVII, B.)

SYN.—*Bryum mamillatum* LINDB. in Hartm. Skand. fl. 9 ed. ii, 36 (1864), et Not. ur. Saells. Fn. Fl. fenn. foerh. ix, 264 (1868), Musc. Scand. 16 (1879). SCHIMP. Synops. 2 ed. 417 (1876). LIMPR. Laubm. ii, 328 (1892). DIXON Trans. Norfolk & Norwich Nat. Soc. vii, 562 (1903).

Autoicous ; in very low, dense tufts, radiculose at base. Lower leaves small and distant, oval-oblong ; upper crowded in a bud-like coma, not decurrent, erecto-patent, oblongo-lanceolate, canaliculate-concave, margin revolute, with a yellow border of 4 rows of long narrow cells ; nerve stout, brownish, excurrent in a denticulate apiculus ; cells rhombic above, rectangular at base. Seta tall rufous, hooked at apex ; capsule pendulous, regular turgidly pyriform, brownish-yellow, not contracted below the mouth ; lid mamillar, with a minute papilla. Teeth of peristome orange, red at base, the dorsal line straight, endostome yellow, free, the processes narrow ; cilia 3 short ; spores yellow, very large. Male infl. minute, concealed among the comal leaves ; bracts broadly ovate, apiculate, nerved.

HAB.—Sandy sea shore, very rare. Fr. 6.

Among sand dunes at Hunstanton Links, Norfolk (*Rev. W. E. Thompson* 1902).

This fine moss was first found in the island of Gothland by Cleve in 1863, and in the Aland islands by the energetic collector Bomansson. I have to thank Mr. Dixon for the opportunity of figuring it.



## BRYUM DIXONI Cardot.

In small compact yellow-green tufts,  $\frac{1}{2}$ —1 in. high. Leaves small, ovate concave, pointed, erecto-divergent, entire; nerve strong continuous, cells rhombic above, quadrate below. (T. CXXVII, E.)

SYN.—*Bryum Dixoni* Nicholson Rev. bryol. 1901, p. 73, t. 3. LIMPR. Laubm. iii, 783 (1903).

Sterile; in small compact yellowish-green tufts  $\frac{1}{2}$ —1 in. high; when dry with a golden gloss, dark brown at base, matted with brown papillose rhizoids. Stem erect, brittle, slightly branched. Leaves small, ovate with short points, narrowly decurrent, imbricated, not twisted when dry, erecto-divergent when moist, concave, margin flat, not limbate, entire, or with a few teeth at apex; nerve strong, yellowish, continuous or very shortly excurrent; cells somewhat incrassate, shortly rhombic above, longer and quadrate below, the marginal narrow and almost linear.

HAB.—Rocks in the bed of stream Alt-Sugach, Ben Narnain, Argyllshire (*Dixon* 1898).

This little moss is very distinct, and remarkable for its short leaves; its position in the huge genus is probably near to *Bryum argenteum*.

*Bryum barbatum* WILS.—Fruit has been found in Norway, and is described by Dr. Hagen as pale yellow-brown, shortly pyriform, contracted below the mouth when dry, the neck longitudinally plicate when dry; lid yellowish, hemispherical; <sup>teeth</sup> orange, lineal-lanceolate, hyaline at point, membrane of endostome half length of teeth, processes fenestrated in middle, cilia 2—3 appendiculate. Male infl. terminal, capitate, bracts large ovato-lanceolate. Arnell regards it as a form of *B. elegans* var. *carinthiacum*.

## PHILONOTIS CAPILLARIS Lindb.

Dioicous; plants very slender,  $\frac{1}{2}$ —1 $\frac{1}{2}$  in. high, but slightly branched, yellowish-green. Leaves rather distant, somewhat divergent, uniform, from an ovate base, lanceolate, gradually attenuated into a long acute point, minutely serrulate and flat at margin, not plicate, nerve vanishing in the apex; cells rather lax, papillose. Perigonial bracts erecto-patent ovato-acuminate, acute, nerved to the apex.

SYN.—*Philonotis capillaris* LINDB. in Hedwigia 1867, p. 40 et in HARTM. Skand. fl. 10 ed. ii, 46 (1871). HUSNOT Musc. Gall. 269, t. 74 (1890). DIXON JAMES. Stud. Handb. 296 (1896). PHILIP. in Rev. bryol. 1897, p. 88.

*Philonotis fontana* var. *capillaris* LINDB. Musc. Scand. 15 (1879). LIMPR. in RABENH. D. kr. fl. Laubm. ii, 569 (1893). Br. Moss-fl. ii, 212.

*Philonotis Marchica* var. *tenuis* BOULAY Musc. Fr. 217 (1884).

HAB.—Crevices of alpine rocks and about springs, rare.

Ben Arthur by Loch Long (*Stirton* 1866). Coire Fioun Lairige, Perthshire (*Cocks* 1900)!!

A further study of this plant and of the fine specimens collected by Mr. Cocks, as well as the excellent descriptions of Husnot and Dixon, have satisfied me that it should stand as a species. The plant from Shanklin should be referred to *P. fontana* var. *pumila* (TURNER), to which probably Lindberg's var. *parvula* also belongs. It approximates much nearer to the type, being only smaller in all its parts.

### PHILONOTIS FONTANA (L.) Brid.

Var. *ampliretis* Dixon in Journ. Bot. 1902, p. 71.

Tufts very lax, light green; stem thin, weak, with a few smooth radicles, simple or divided, sometimes with deciduous axillary shoots in the upper part of stem. Leaves very lax, patent, not decurrent, lanceolate, acutely pointed, not plicate, plane at margin and with short teeth, nerve very thin, ending in or below the point; all the cells lux, thin-walled and chlorophyllose. Sterile.

SYN.—*Philonotis fontana* var. *propagulifera* J. WEBER in sched.

*P. Marchica* var.  $\beta$  *laxa* et  $\gamma$  *fluitans* LIMPR. in litt.

*P. laxa* LIMPR. Laubm. ii, 563.

HAB.—Crimsworth Dene, Hebden Bridge (Needham 1900). Chorley and near Longridge, Lancs. (Beesley 1900)!!

Mr. Dixon has clearly traced this up to the polymorphous *P. fontana*, although it differs considerably in appearance. Venturi had already named another variety *laxa*.

### MNIUM LYCOPODIOIDES (Hook.) Schwaeg.

Dioicous; near *M. orthorhynchum*, but in looser tufts. Leaves dark green, decurrent, distant, upper narrow at base, elongated, lingulate, margin limbate, with pairs of acute teeth; capsule horizontal, subcylindrical slightly curved; lid rostrate. (T. CXXXVIII, A.)

SYN.—*Bryum lycopodioides* HOOK. Msc. SPRENG. in L. Syst. veg. 16 ed. iv, P. I, p. 214 (1827).

*Mnium lycopodioides* SCHWAEGL. Suppl. II, P. II, p. 24, t. 160 (1826). Br. Eur. fasc. 31, t. 2 (1846). C. MUELL. Synops. i, 165 (1849). SCHIMP. Synops. 393 (1860), 2 ed. 484. LIND. in Notis. ur. Saellsk. Fauna et Fl. fenn. ix, 41 (1867). JURATZ. Laub. Oester.-Ung. 304 (1882). BOULAY Msc. Fr. 235 (1884). LIMPR. in RABEN. D. kr. fl. Laubm. ii, 457 (1893). PHILIB. in Rev. bryol. 1895, p. 2.

*Bryum Polla lycopodioides* BRID. Bry. univ. i, 853 (1827).

*Polla lycopodioides* BRID. op. cit. ii, 817 (1827).

*Astrophyllum lycopodioides* LINDB. Msc. Scand. 14 (1879).

*Mnium orthorhynchum* var. *lycopodioides* HUSN. Msc. Gall. 255 (1889).

Dioicous; very near *M. orthorhynchum*, but with more distant, narrower, and longer leaves, with laxer areolation. Plants tall and slender, the leaves distant, lower oblong, almost entire, upper gradually elongate-lingulate, erecto-patent, decurrent, acutely pointed, bordered by 2 rows of rufous incrassate cells, and pairs of acute teeth; cells larger than in *M. orthorhynchum*, nerve red, sharply toothed at back above, and excurrent,

in the apiculus. Seta reddish, slender, capsule horizontal, elongated, cylindraceous, slightly incurved, brownish; lid conic, obliquely rostrate, teeth yellow, endostome yellow, the basal membrane half length of processes; cilia 2—3.

HAB.—Wet stony ground; very rare.

Ben Lawers (*Dixon* 1893)!! Believed also to have been found by Dr. Stirton by the shore of Loch Awe above Taycreggan pier.

Philibert, in *Revue bryol.*, distinguishes this species from *M. orthorhynchum* by the taller lively green tufts and longer leaves, with larger cells. The European plant was long supposed to differ from the Himalayan, but they are now generally united.

### THUIDIUM PHILIBERTI *Limpr.*

Dioicous; in lax yellowish-brown tufts; bipinnate, paraphyllia with filiform divergent branches. Stem leaves cordate ovato-lanceolate, with long fine points, nerve  $\frac{2}{3}$  the length; branch leaves ovate. Perich. bracts lanceolate, not ciliate, ending in a long recurved straplike subula. Apex of ramuline leaves with the terminal cell quadrate, two-pointed. (T. CXXVIII, B.)

SYN.—*Thuidium intermedium* (non MITT.) PHILIB. in *Rev. bryol.* 1893, p. 33.

*Thuidium Philiberti* LIMPR. in RABENH. D. KR. fl. Laubm. ii, 835 (1895). BEST in Bull. Torrey Bot. Club xxiii, 78, t. 260 (1896).

Dioicous; in loose yellowish-brown tufts, the stems prostrate, bipinnate, with numerous filiform paraphyllia, with divergent branches composed of quadrate cells which are broader at the upper ends than at the base, branches and ramuli filiform. Stem leaves large, wide and cordate at base, ovato-lanceolate, with long fine recurved points, 4-plicate, margin obsoletely toothed, revolute in the lower half, nerve  $\frac{2}{3}$  its length; cells incrassate, longish oval, with a central papilla on both sides; those of base elongate and rectangular. Branch leaves ovate, concave, gradually acutely pointed, nerved for  $\frac{2}{3}$  the length; ramuline leaves ovate, acute, terminal cell truncate, with two projecting points. Outer perich. bracts papillose, inner lanceolate, biplicate, gradually narrowed into a long strap-shaped recurved subula without cilia; nerve ending below the subula; cells lineal, 3—6 times long as broad; seta red, capsule erect at base, curved-cylindric, reddish-brown; lid conico-rostrate, curving upward; teeth yellow, papillose, endostome with 2—3 slender nodulose cilia.

HAB.—Wet places among alpine rocks, rare. FR. 10.

Ben Lawers (*Braithwaite* 1865)!! Craig Chailleach, Ben Laoigh and others of the Breadalbane range (*Dixon* 1893)!! Near Loch Lairige (*Cocks* 1900)!!

I found this moss nearly 40 years ago, on my first visit to Ben Lawers, and laid it aside as a poor specimen of *T. recognitum*, and we owe it to Mr. Dixon's sharp eye that its true character was detected; it really comes nearest to *T. delicatulum*.

AMBLYSTEGIUM (§ EUAMBLYSTEGIUM) COMPACTUM (C. M.) Austin.

Autoicous? resembling *A. serpens*; in flat spreading patches. Stem and branches very slender, stoloniferous. Leaves erecto-patent, finely serrulate at base, cauline ovato-lanceolate, acuminate, nerve yellowish,  $\frac{2}{3}$  length of leaf, with rhizoids at back; cells lineal-rhomboid, quadrate at angles. Capsule suberect, lid conic, rostellate. (T. CXXVIII, C.)

SYN.—*Hypnum serpens* var. *compactum* Hook. in DRUMM. Musc. Amer. no. 188.

*Hypnum compactum* C. MUELL. Synops. ii, 408 (1851). SULLIV. Icon. musc. 201, t. 123 (1864). LESQ. JAMES Moss. N. Amer. 375 (1884).

*Amblystegium serratum* BR. SCH. Bry. Eur. fasc. 55—56, in note sub *A. radicale* p. 11 (1853)

*Stereodon compactus* MITT. Journ. Linn. Soc. viii, 43 (1864).

*Amblystegium densum* MILDE Bot. Zeit. 1864, Beil. 21.

*Rhynchostegium tenellum* var. *brevifolium* LINDB. in litt. RABENH. Bryoth. no. 750 (1864).

*Amblystegium cryptarum* vel *latebrarum* SAUTER in sched.

*Amblystegium serpens* var. *cryptarum* (SAUTER) ARNOLD in RABENH. Bryoth. no. 841 (1865).

*Brachythecium densum* JURAT. in RABENH. Bryoth. no. 995 (1867). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 136 (1897).

*Hypnum densum* MILDE Bry. Siles. 360 (1869), (non C. MUELL. Synops. ii, 335).

*Amblystegium compactum* AUSTIN Musc. Appal. 372. MACOUN & KINDB. Cat. Canad. pl. 221 (1892). CHENEY in Bot. Gaz. xxiv, 262 (1897). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 331 (1898). HÉRIBAUD Musc. d'Auvergne (1899). DIXON in Journ. Bot. 1900, p. 175.

*Amblystegium dissitifolium* KINDB. in Mac. & Kindb. op. c. 220 (1892).

*Amblystegium subcompactum* C. MUELL. & KIND. op. c. 221 (1892).

Autoicous and ? dioicous; growing in thin dull green or yellowish patches, and resembling a form of *A. serpens*. Stems slender and fragile, slightly radiculose, creeping and irregularly branched. Leaves rather distant, patent and ascending, secund and pointing upward on the branches, slightly decurrent; stem leaves ovato-lanceolate, gradually tapering into a wide acumen, margin erect, minutely serrulate towards base, nerve reaching middle or nearly to apex, often producing rhizoids at the back; cells linear-rhomboid, at basal angles quadrate. Perichæatial bracts sheathing, broadly lanceolate, shortly acuminate, serrulate at apex, faintly nerved for  $\frac{3}{4}$  the length. Capsule small, suberect, wide-mouthed, with a distinct neck, oblong and a little incurved; lid conico-rostellate, pale yellow; peristome pale yellow; cilia solitary, very short.

HAB.—Caves and cavities of rocks in limestone districts, rare.

Smoo cave, Durness, Sutherland, and Glen Dubh, Inchnadamph, Sutherland (Dixon 1899)!! Allt-nan-Uamh, Inchnadamph (Nicholson, Salmon, and Dixon). Dovedale, Derbyshire (Dixon 1899).

In his admirable paper in *The Journal of Botany* Mr. Dixon has cleared up much of the confusion which existed about this interesting plant, and I have nothing to add, except that on one of the specimens he kindly sent me I found a solitary male inflorescence with two antheridia; this, however, does not settle the sexual



question. The fertile American plant differs much from the British in habit, for it grows in dense erect tufts about one inch high, and the stem leaves, as in ours, present much variation in the length of the nerve. Figures 2 and 5 are drawn from Sullivan's *Icones*.

**AMBLYSTEGIUM (§ SCORPIDIUM) TURGESCENS (*Jens.*) *Lindb.***

Dioicous; in dense-leaved, tumid yellowish-green tufts. Leaves imbricated, julaceous, broadly oblong, concave, suddenly terminated by a very short apiculus, nerve short, forked, cells very narrow and vermicular, reetangular at base. (T. CXXVIII, D.)

SYN.—*Hypnum turgescens* JENSEN Vidensch. Medd. fra Naturh. foren. i Kjobenh. 63 (1858). SCHIMP. Synops. 648 (1860), 2 ed. 794. BOULAY Musc. Fr. 18 (1884). HUSN. Musc. Gall. 415, t. 120 (1894). LIMPR. in RABENH. D. kr. fl. iii, 563 (1899).

*Stereodon turgescens* MITT. in Journ. Linn. Soc. Bot. viii, 42 (1865).

*Amblystegium turgescens* LINDB. Musc. Scand. 33 (1879).

*Hypnum aduncum*  $\delta$  *molle* *b turgescens* SANIO Besch. 38 (1885).

*Calliergon turgescens* KINDB. Eur. & N. Amer. Bryin. 84 (1897).

Dioicous; resembling *A. scorpioides*, growing in soft yellowish-green or brownish tufts, glossy, 3—10 in. long, erect or ascending, simple or with short fasciculate branches. Leaves turgid, imbricated and julaceous, from a rounded non-decurrent base, broadly oblong, obtuse with a short apiculus, very concave, cucullate at apex from the strongly incurved margin, nerve yellowish,  $\frac{1}{3}$  length of leaf, single or forked; cells elongated and incrassate at base, 6—8 times long as wide, narrower at margin, rectangular at middle, some quadrate and oval at angles. Fruit unknown.

HAB.—Wet places on moors where lime exists.

Ben Lawers (*Rev. C. Binstead* 1902) !

**AMBLYSTEGIUM FILICINUM.**

Var.  $\delta$ . **Whiteheadii** *Wheldon*, Journ. Bot. 1899, p. 15.

Dull greenish-yellow; stems tall, slender, erect, cæspitose or floating, irregularly branched or slightly pinnate; paraphyllia few and tomentum nearly absent. Leaves more distant, narrower, less acuminate, not secund but erecto-patent.

HAB.—Wet sandy ground.

Southport, Birkdale, Ainsdale and St. Anne's, Lancs. (*Wheldon*). Gullane Links, Haddington (*Dixon* 1897).

**AMBLYSTEGIUM FLUITANS.**

Var.  $\theta$ . **Robertsiae** *Ren. & Dixon*, Journ. Bot. 1901, p. 275.

Floating, variegated with yellow, golden-brown and purplish-red, glossy. Stem almost simple, with only a few short distant branches. Leaves rather closely set, erect, spreading very slightly, falcate at points of branches, narrow lanceolate,



gradually tapering into a long sharply-toothed subula nerve, slender, reaching half way; cells long, narrow, thick-walled, basal rather incrassate. Near var. *Holtii*.

HAB.—Bog near Craig-lyn-Dyfi, Merionethshire (*Miss M. Roberts* 1898).

Var. *ι. squalidum* Ren. & Dixon l.c. 276.

In dense intricate masses, pale dull green above, dirty reddish-brown below. Stems rather robust, but little branched; leaves somewhat complanate, falcate in upper part of branches, rather large, lanceolate, ending rather abruptly in a fine, faintly-toothed piliform subula.

HAB.—Stagnant water, Dawley, Shropshire (*Rev. W. H. Painter* 1896).

Var. *κ. atlanticum* Renauld l.c. 277.

Near var. *Jeanbernati*, as is also the last. Differs by the green colour and chlorophyllose tissue. Leaves larger, oval, suddenly contracted into a short acumen, nerve a little broader, basal tissue laxer, median cells wider and shorter.

HAB.—N. Derbyshire (*Prof. Barker*). Summit of Pendle hill, Lancs. (*Wheldon* 1898). R. Wyre, W. Lancs. (*Wilson* 1900). Arncliffe wood, N. Yorks (*Ingham* 1900).

*Isoethicum* var. *mysuroides*, *brachythecioides* DIXON Journ. Bot. 1902, p. 379.

Robust, 3—5 in. long, growing in large masses, primary stem hardly stoloniform, secondary procumbent not dendroid, with straight irregular branches. Stem leaves large, with long points, branch leaves nearly similar, with long fine points.

HAB.—Quiraing hill, Skye (*Dixon* 1893). Ben Clibrick, Sutherland (*Dixon* 1899). Lough Swilly, Ireland (*Hunter* 1902). Connor hill, Kerry.

### PLAGIOTHECIUM PILIFERUM (*Sw.*) B.S.

Autoicous; in soft, flat, glossy tufts. Stem stoloniferous, leaves bifarious, broadly ovate, decurrent, elongated into a flexuose hair. Capsule suberect, longish cylindric, with a long neck; lid convex, obtuse, yellow. (T. CXXVIII, E.)

SYN.—*Leskea pilifera* SWARTZ Summa Veg. Scand. 41 (1814). Hartm. Skand. fl. 419 (1820).

*Hypnum denticulatum* γ *piliferum* WAHLENB. Fl. suec. ii, 710 (1826).

*Hypnum orthocarpum* AONGST. Disp. musc. Scand. p. 2 (1832).

*Neckera pilifera* SPRUCE Musc. Pyr. exs. no. 66 (1847).

*Hypnum trichophorum* SPRUCE Musc. Pyr. exs. no. 25 et in Ann. Mag. nat. hist. 2 ser. iii, 276 (1848). C. MUELL. Synops. ii, 252 (1851). BOULAY Musc. Fr. 86 (1884).

*Plagiothecium piliferum* BR. SCH. Bry. Eur. fasc. 48, p. 8, t. 3 (1851). SCHIMP. Synops. 577 (1860), 2 ed. 692. HUSN. Musc. Gall. 349, t. 100 (1893). LIMPR. in RABENH. D. kr. fl. Laubm. iii, 251, fig. 392 (1897). D. A. JONES in Journ. Bot. 1904, p. 156.

*Plagiothecium trichophorum* VENT. & BOTT. Enum. crit. 18 (1884).

Autoicous; in flat, soft, yellowish-green shining patches. Stem slender, much branched, stoloniferous and prostrate. Leaves complanate, decurrent, ovate, suddenly elongated into a bent hair, concave, irregularly sulcate, margin narrowly recurved, entire, nerve very short and faint; cells narrow, linear, 10 times long as wide, quadrate and rectangular at base. Perich. bracts erect, thin and nerveless, suddenly elongated at the rounded point

into a reflexed hair, seta red, capsule cernuous or erect, with a long neck, cylindraceous, castaneous, lid high convex, obtusely pointed, yellow; teeth lineal, whitish, cilia none.

HAB.—Shady alpine rocks, very rare. Fr. 6—7.

Ben Lawers (*J. B. Duncan* 1902)!!

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- T. 125. *A. Catharinea tenella* (Bedgbury wood, *E. S. Salmon*). *B. Pottia commutata* (Seaford, *Nicholson*). *C. Fissidens Julianus* (Bewdley, *Duncan*). *D. Dicranum strictum* (Abbot's Bromley, *Bagnall*). *E. Ditrichum vaginans* (Antrim, *Davies*). *F. Ephemerum stellatum* (Bedgbury wood, *Nicholson*).
- T. 126. *A. Mollia sterilis* (Lewes, *Nicholson*). *B. Barbula cordata* (Saunton, *Holmes*). *C. Tortula cernua* (Barwick, *Webster*). *D. T. inermis* (Cowie moss, *Kidston*). *E. Mollia crispata* (Wearhead, *Ingham*). *F. Grimmia arenaria* (Llanberis, *Dixon*). *G. Grimmia homodictya* (Inchnadamph, *Dixon*).
- T. 127. *A. Tetraplodon Wormskjoldii* (Widdy Bank Fell, *Slater*). *B. Bryum mamillatum* (Hunstanton, *Dixon*). *C. B. arcticum* (Craig Chailleach, *Dixon*). *D. B. Lawersianum* (Ben Lawers, *Dixon*). *E. B. Dixoni* (Ben Narnain, *Dixon*).
- T. 128. *A. Mnium lycopodioides* (Ben Lawers, *Dixon*). *B. Thuidium Philiberti* (Ben Lawers, *Brailwaite*). *C. Amblystegium compactum* (Durness, *Dixon*). *D. A. turgescens* (Ben Lawers, *Binstead*). *E. Plagiothecium piliferum* (Ben Lawers, *Duncan*).
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#### POSTSCRIPT.

It was the author's intention to include the *Sphagna* in this work, but he finds that to study them again at the age of 81, and draw some 25 plates, would be hopeless, and he has suggested to Mr. Horrell (who is an ardent follower of Warnstorf) that he should prepare such a work for the Ray Society; this he hopes to accomplish, and do justice to this elegant and difficult group of plants.

It is satisfactory to find that Bryophilists are increasing rapidly in this country, and to the many friends among them who have supplied him with specimens he desires to record his sincere thanks. *Vale*.

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Vernimm's und siehe die Wunder der Werke,  
 Die die Natur dir aufgestellt!  
 Verkündigt Weisheit und Ordnung und Stärke  
 Dir nicht den Herren, den Herren der Welt?  
 Kannst du der Wesen unzählbare Heere  
 Den kleinsten Staub fühllos beschau?  
 Durch wen ist alles? O gieb ihm die Ehre!  
 Mir, ruft der Herr, sollst du vertraun.  
 Mein ist der Kraft, mein ist Himmel und Erde,  
 An meinen Werken kennst du mich.  
 Ich bin's, und werde sein, den ich sein werde,  
 Dein Gott und Vater ewiglich.  
 Ich bin dein Schöpfer, bin Weisheit und Güte,  
 Ein Gott der Ordnung und dein Heil;  
 Ich bin's! mich liebe von ganzem Gemüthe  
 Und nimm an meiner Gnade Theil.

EHRHART in *Hannov. Magazin*, 1780.

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# CLASSIFIED LIST OF SPECIES.

## Fam. 19. HYPNACEÆ.

### Subf. 1. *Leskeæ*.

#### THUIDIUM B. S.

#### § 1. *Euthuidium*.

1. *T. tamariscifolium* (Neck.) Lindb.
2. *T. delicatulum* (L. Hed.) Mitt.
3. *T. Philiberti* Limpr.
4. *T. recognitum* (Hed.) Lindb.

#### § 2. *Tetrathamnium*.

5. *T. abietinum* (L.) B. S.
6. *T. hystricosum* Mitt.

#### § 3. *Elodium*.

7. *T. Blandowii* (W. M.) Schp.

#### LESKEA Hed.

#### § 1. *Pseudoleskea*.

1. *L. catenulata* (Brid.) Mitt.
2. *L. nervosa* (Brid.) Myrin.

#### § 2. *Euleskea*.

3. *L. Polycarpa* Ehr.
- β. *paludosa* (Hed.) Schp.

#### ANOMODON Hk. T.

1. *A. viticulosus* (L.) Hk. T.
2. *A. attenuatus* (Schr.) Hueb.
3. *A. longifolius* (Schl.) Hartm.

### Subf. 2. *Hypnæ*.

#### AMBLYSTEGIUM B. S.

#### § 1. *Euamblystegium*.

1. *A. filicinum* (L.) D. N.  
β. *trichodes* (Brid.)  
γ. *elatum* Schp.  
δ. *Whiteheadii* Wheld.
2. *A. fallax* (Brid.) Milde.
3. *A. curvicaule* (Jur.) Dix.  
β. *strictum* Dix.
4. *A. irriguum* (Wils.) Schp.
5. *A. fluviatile* (Swz.) Schp.

6. *A. varium* (Hed.) Lindb.

#### β. *oligorhizon* (Guem.) Lindb.

7. *A. serpens* (L.) B. S.

#### β. *tenue* Schp.

#### γ. *depaupertum* Boul.

8. *A. compactum* (C. M.) Aust.
9. *A. juratzkæ* Schp.
10. *A. radicale* (P. B.) Mitt.  
β. *serotinum* Lind.
11. *A. confervoides* (Brid.) B. S.
12. *A. Sprucei* (Bruck) B. S.
13. *A. riparium* (L.) B. S.

#### β. *longifolium* Schults.

#### γ. *abbreviatum* Schp.

14. *A. Kochii* (B. S.) Lindb.

#### § 2. *Campyliadelphus*.

15. *A. elodes* (Spruce) Lindb.
16. *A. chrysophyllum* (Brid.) D. N.  
β. *erectum* Bagn.
17. *A. protensum* (Brid.) Lindb.
18. *A. stellatum* (Schr.) Lindb.
19. *A. polygamum* B. S.  
β. *stagnatum* Wils.

#### § 3. *Drepanocladus*.

20. *A. glaucum* (Lam.) Lindb.  
β. *sulcatum* Schp.
21. *A. decipiens* D. N.
22. *A. falcatum* (Brid.) D. N.  
β. *gracilescens* Schp.  
γ. *fluctuans* Schp.
23. *A. Sendtneri* (Schp.) D. N.  
β. *Wilsoni* (Schp.) Lind.  
γ. *hamatum* (Schp.) Lindb.
24. *A. intermedium* Lindb.
25. *A. revolvens* (Swz.) D. N.
26. *A. lycopodioides* (Neck.) D. N.
27. *A. vernicosum* Lindb.  
β. *majus* Lindb.
28. *A. aduncum* (L.) Lindb.  
β. *plumulosum* B. S.

29. *A. exannulatum* (Guem.) D. N.

- β. purpurascens Schp.
- γ. Rotæ D. N.
- δ. acutum Sanio.
- ε. brachydietyon Rend.

30. *A. finitans* (L.) D. N.

- β. submersum Schp.
- γ. Jeanbernati Rend.
- δ. paludosum Sanio.
- ε. Arnellii Sanio.
- ζ. falcatum Schp.
- η. Holtii Sanio.
- θ. Robertsiæ Ren. Dix.
- ι. squalidum Ren. Dix.
- κ. atlanticum Rend.

31. *A. Kneiffii* Schp.

- β. gracilescens Schp.
- γ. tenue Schp.
- δ. intermedium Schp.
- ε. polycarpon Bland.
- ζ. pungens H. Muel.
- η. pseudofontanum Sanio.
- θ. paternum Sanio.

§ 4. *Scorpidium*.32. *A. scorpioides* (L.) Lindb.33. *A. turgescens* (Jens.) Lindb.§ 5. *Hygrohypnum*.34. *A. Smithii* (Swz.) Lindb.35. *A. dilatatum* (Wils.) Lindb.36. *A. molle* (Dick.) Lindb.

## β. Schimperii Lorz.

37. *A. ochraceum* (Turn.) Lindb.

## β. flaccidum Milde.

38. *A. palustre* (Hud.) Lindb.

## β. hamulosum B. S.

## γ. subsphaericarpon Schlr.

39. *A. eugyrium* (Schp.) Lindb.

## β. Mackayi Schp.

§ 6. *Calliargon*.40. *A. giganteum* (Schp.) D. N.41. *A. cordifolium* (Hed.) D. N.42. *A. sarmentosum* (Wahl.) D. N.43. *A. stramineum* (Dick.) D. N.44. *A. trifarium* (W. M.) D. N.

## HYPNUM Dill. L.

§ 1. *Myurium*.1. *H. Hochstetteri* Schp.§ 2. *Scleropodium*.2. *H. purum* L.3. *H. illecebrum* P. B.4. *H. caespitosum* Wils.§ 3. *Panckowia*.5. *H. striatum* Schrb.6. *H. meridionale* Schp.7. *H. striatulum* Spruce.8. *H. strigosum* Hoff.

## β. præcox (Hed.) Wahl.

9. *H. circinatum* Brid.10. *H. pallidirostre* Braun.11. *H. prælongum* L.

## β. Stokesii (Turn.) Brid.

12. *H. Swartzii* Turn.13. *H. Schleicheri* Hed. fil.14. *H. speciosum* Brid.15. *H. hians* Hed.16. *H. crassinerve* Tayl.

## β. tenue Braith.

§ 4. *Rhynchostegiella*.17. *H. Teesdalei* Sm.18. *H. curvisetum* Brid.19. *H. litoreum* D. N.20. *H. Algirianum* Brid.§ 5. *Rhynchostegium*.21. *H. piliferum* Schrb.22. *H. cirrosum* Schwg.23. *H. rusciforme* Neck.

## β. atlanticum Brid.

## γ. inundatum Brid.

## δ. prolixum (Dick.) Turn.

24. *H. murale* Neck.

## β. complanatum B. S.

## γ. julaceum B. S.

25. *H. confertum* (Dick.) B. S.26. *H. megapolitanum* Bland.27. *H. rotundifolium* Scop.§ 6. *Brachythecium*.28. *H. velutinum* L.

## β. prælongum Schp.

## γ. intricatum Hed.

29. *H. pseudoplumosum* Brid.

## β. homomullum Schp.

30. *H. viride* Lamk.31. *H. reflexum* Starke.

## β. micropus Schp.

32. *H. Starkei* Brid.

33. *H. campestre* Bruch.  
 34. *H. glaciale* (B. S.) Hart.  
      $\beta$ . *Huntii* Schp.  
 35. *H. curtum* Lind.  
 36. *H. rutabulum* L.  
      $\beta$ . *longisetum* Brid.  
      $\gamma$ . *flavescens* Schp.  
      $\delta$ . *plumulosum* Schp.  
      $\epsilon$ . *densum* Schp.  
      $\zeta$ . *robustum* Schp.  
 37. *H. rivulare* Bruch.  
      $\beta$ . *cataractarum* Saut.  
      $\gamma$ . *latifolium* Husn.  
      $\delta$ . *tenue* Dixon.  
      $\epsilon$ . *chrysophyllum* Bagn.  
 38. *H. plumosum* Huds.  
      $\beta$ . *Midei* Schp.  
 39. *H. albicans* Neck.  
 40. *H. glareosum* Bruch.  
     § 7. *Pleuropus*.  
 41. *H. triohoides* Neck.  
 42. *H. lutescens* Huds.  
 43. *H. sericeum* L.  
     LESQUEREUXIA B. S.  
 1. *L. plicata* (Schl.) Lind.  
 2. *L. filamentosa* (Dick.) Lind.  
 3. *L. atrovirens* (Dick.) Best.  
 4. *L. saxicola* Mol.  
     ISOTHECIUM Brid.  
 1. *I. myosuroides* (L.) Brid.  
      $\beta$ . *rivulare* Holt.  
      $\gamma$ . *tenuinerve* Kind.  
      $\delta$ . *minus* Bagn.  
      $\epsilon$ . *debile* Brait.  
      $\zeta$ . *brachythecioides* Dix.  
 2. *I. viviparum* (Neck.) Lind.  
      $\beta$ . *robustum* Boul.  
     PTEROGONIUM Swz.  
 1. *P. ornithopodioides* (Hud.) Lind.  
     PTERYGNANDRUM.  
 1. *P. filiforme* (Timm.) Hed.  
      $\beta$ . *decipiens* (W. M.) B. S.  
      $\gamma$ . *filascens* (Boul.)  
     HELICODONTIUM Schw.  
 1. *H. pulvinatum* (Wahl.) Lind.  
     HABRODON Schp.  
 1. *H. perpusillus* (D. N.) Lind.

- Subf. 3. *Stereodontea*.  
     § 1. *Theliea*.  
     MYURELLA B. S.  
 1. *M. tenerrima* (Brid.) Lind.  
 2. *M. julacea* (Vill.) B. S.  
      $\beta$ . *scabrifolia* Lind.  
     HETEROCLADIUM B. S.  
 1. *H. squarrosulum* (Voit) Lind.  
 2. *H. heteropterum* (Bruch) B. S.  
      $\beta$ . *flaccidum* B. S.  
     § 2. *Eustereodontea*.  
     HYLOCOMIUM B. S.  
     § 1. *Euhylocomium*.  
 1. *H. umbratum* (Ehr.) B. S.  
 2. *H. brevirostre* (Ehr.) B. S.  
 3. *H. Pyrenaicum* (Spruce) Lind.  
 4. *H. proliferum* (L.) Lind.  
     § 2. *Pleurozium*.  
 5. *H. parietinum* (L.) Lind.  
     § 3. *Rhytidiadelphus*.  
 6. *H. triquetrum* (L.) B. S.  
 7. *H. squarrosulum* (L.) B. S.  
      $\beta$ . *calvescens* Wils.  
 8. *H. loreum* (L.) B. S.  
     § 4. *Rhytidium*.  
 9. *H. rugosum* (L.) D. N.  
     CAMPYLUM (Sull.) Mitt.  
 1. *C. Halleri* (Swz.) Lind.  
 2. *C. hispidulum* (Brid.) Mitt.  
      $\beta$ . *Sommerfeltii* (Myr.) Lind.  
     CTENIDIUM (Schp.) Mitt.  
 1. *C. molluscum* (Hed.) Mitt.  
      $\beta$ . *croceum* Tayl.  
      $\gamma$ . *condensatum* Schp.  
      $\delta$ . *robustum* Boul.  
      $\epsilon$ . *fastigiatum* Bosw.  
 2. *C. procerrimum* Mol.  
     HYCOMIUM Schp.  
     flagellare (Dick.) Schp.  
     PTILIUM (Sull.) D. N.  
     Crista-Castrensis (L.) D. N.  
     SEMATOPHYLLUM Mitt.  
 1. *S. demissum* (Wils.) Mitt.  
 2. *S. micans* (Wils.)



## STEREODON (Brid.) Mitt.

§ 1. *Drepanium*.

1. *S. Lindbergii* Mitt.
2. *S. imponens* (Hed.) Brid.
3. *S. Bambergeri* (Schp.) Lind.
4. *S. cupressiformis* (L.) Brid.
  - β. *tectorum* B. S.
  - γ. *brevisetum* Schp.
  - δ. *uncinatus* B. S.
  - ε. *ericetorum* B. S.
  - ζ. *longirostris* B. S.
  - η. *elatus* B. S.
  - θ. *mamillatus* Brid.
  - κ. *filiformis* Huds.
5. *S. resupinatus* (Wils.)
  - β. *tenuis* Hook.
6. *S. revolutus* Mitt.
7. *S. Canariensis* Mitt.
8. *S. circinalis* (Hook.) Brid.
9. *S. callichrous* Brid.
10. *S. hamulosus* (Brid.) Lind.

§ 2. *Pylaiea*.

11. *S. incurvatus* (Schrab.) Mitt.
12. *S. polyanthos* Schrb. Mitt.
13. *S. subrufus* (Wils.) Lind.
14. *S. rufescens* (Dick.) Mitt.

## ISOPTERYGIUM Mitt.

1. *I. pratense* (Koch) Lind.
2. *I. Muelleri* (Schp.) Lind.
3. *I. depressum* (Bruch) Mitt.
4. *I. elegans* (Hook.) Lind.
  - β. *Schimperi* (Jur. Milde) Limp.
  - γ. *nanum* (Jur.) Walt. Mol.
5. *I. pulchellum* (Dick.) Lind.
  - β. *nitidum* (Wahl.) Lind.
6. *I. repens* (Poll.) Lind.

## PLAGIOTHECIUM Schp.

1. *P. striatellum* (Brid.) Lind.
2. *P. latebricola* (Wils.) B. S.
3. *P. undulatum* (L.) B. S.
4. *P. denticulatum* (L.) B. S.
  - β. *Aptychus* Spruce.
  - γ. *Donii* (Sm.) Lind.
  - δ. *majus* Boul.
5. *P. silvcatum* (Huds.) B. S.
  - β. *Roesii* (Hampe) Lind.
  - γ. *orthocladum* Schp.

6. *P. succulentum* (Wils.) Lind.7. *P. piliferum* (Swz.) B. S.

## ACROCLADIUM Mitt.

1. *A. cuspidatum* (L.) Lind.
  - β. *pungens* Schp.
  - γ. *fluitans* Kling.
  - δ. *cæspitosum* Whitehd.

## ENTODON C. Muell.

1. *E. orthocarpus* (La Pyl.) Lind.

## Fam. 20. PTERYGOPHYLLACEÆ.

## PTERYGOPHYLLUM Brid.

1. *P. lucens* (L.) Brid.

## CYCLODICTYON Mitt.

1. *C. læte-virens* (H. T.) Mitt.

## DALTONIA H. T.

1. *D. splachnoides* (Sm.) H. T.

## Fam. 21. NECKERACEÆ.

Subf. 1. *Neckereæ*.

## POROTRICHUM (Brid.) Mitt.

1. *P. alopecurum* (L.) Mitt.
  - β. *acutum* Lind.
2. *P. angustifolium* (Holt) Dix.

## HOMALIA Brid.

1. *H. trichomanoides* (Schrab.) Brid.

## NECKERA Hed.

§ 1. *Leiophyllum*.

1. *N. complanata* (L.) Hook.
  - β. *tenella* Schp.

§ 2. *Rhystophyllum*.

2. *N. crispa* (L.) Hed.
  - β. *falcata* Boul.
3. *N. fontinaloides* (Lam.) Lind.
  - β. *Philippei* (B. S.) Lind.
4. *N. pennata* (L.) Hed.

## ALSIA Sull.

1. *A. Smithii* (Dick.) Lind.

Subf. 2. *Meteorieæ*.

## CLIMACIUM W. M.

1. *C. dendroides* (L.) W. M.
  - β. *depauperata* Boul.

## FONTINALIS (Dill.) L.

1. *F. antipyretica* L.
  - β. *gigantea* Sull.
  - γ. *cymbifolia* Nichol.



2. *F. gracilis* Lind.3. *F. dolosa* Card.4. *F. squamosa* L.    *β. Curnowii* Card.5. *F. Dalecarlica* Schp.6. *F. Dixoni* Card.7. *F. seriata* Lind.    § 3. *Cryphææ*.    *ANTITRICHIA* Brid.1. *A. ourtipendula* (Hed.) Brid.    *β. Californica* Sull.    *LEUCODON* Schwg.1. *L. sciuroides* (L.) Schwg.    *β. Morensis* (Schw.) D.N.    *CRYPHÆA* W. M.1. *C. arborea* (Hud.) Lindb.2. *C. Lamyi* (Mont.) Lind.    *HEDWIGIA* Ehr.1. *H. imberbis* (Sm.) Spr.2. *H. albicans* (Web.) Lind.    *β. leucophæa* B. S.    *γ. secunda* B. S.    *δ. viridis* B. S.    *ε. striata* Wils.

## ADDENDA.

2\*. *Catharinea tenella* Roehl.3\*. *Ditrichum vagipans* (Sull.) Hampe.— — *zonatum* (Brid.)16. *Dicranum strictum* Schl.1.\* *Ephemerum stellatum* Phil.9.\* *Pottia commutata* Limpr.    *Tortula cernua* (Hueb.) Lind.14.\* — — *inermis* (Brid.) Mont.    *Mollia sterilis* (Nichol.)    — *crispata* (Nees Hsch.)    *Barbula cordata* (Jurat.)    *Grimmia arenaria* Hampe.19. — — *Ungerii* Jurat.    — *homodictya* Dix.    *Tetraplodon Wormskjoldii* (Horn.)

Lind.

*Bryum arcticum* (R. Br.) B. S.    — *Lawersianum* Phil.    — *mamillatum* Lind.    — *Dixonii* Card.4.\* *Philonotis capillaris* Lind.4.\* *Mnium lycopodioides* (Hook.) Schw.

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*The species adopted are in heavy type ; the names in small type are synonyms.*

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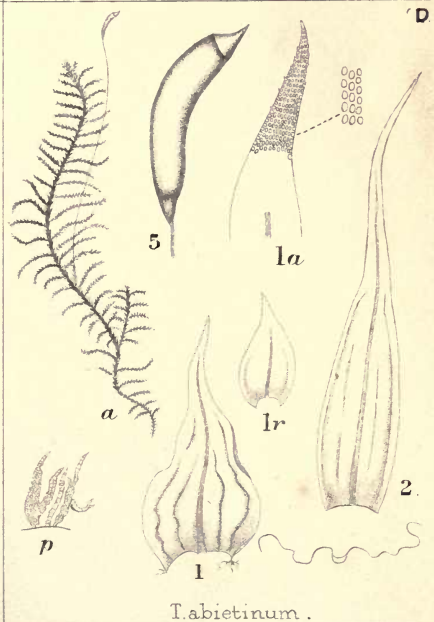
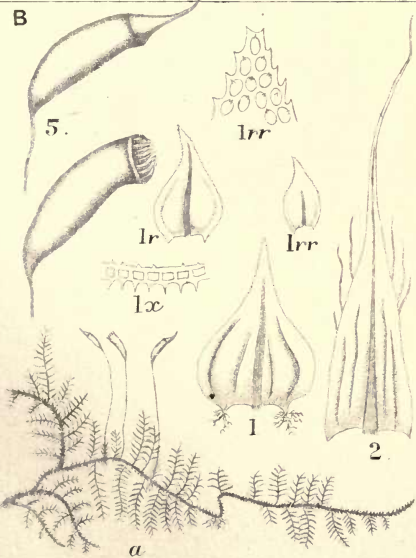
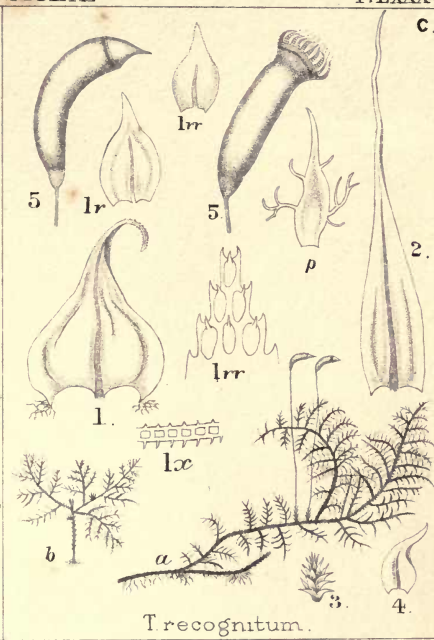
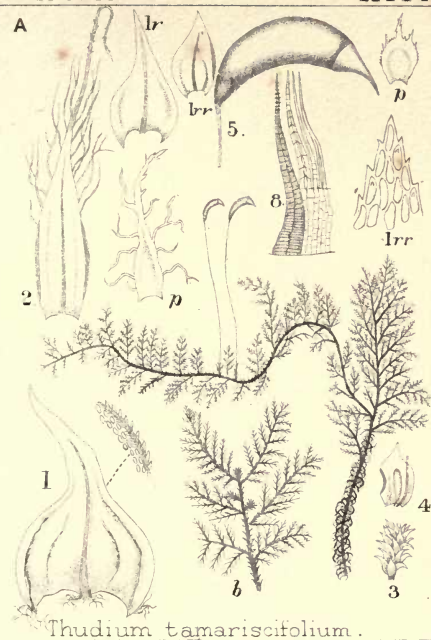
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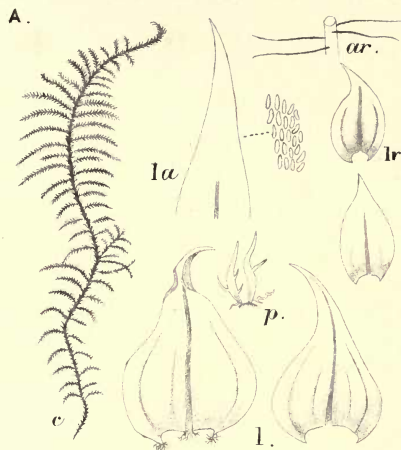
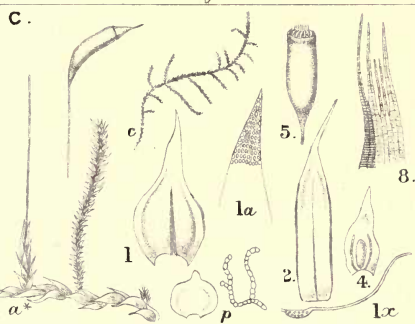
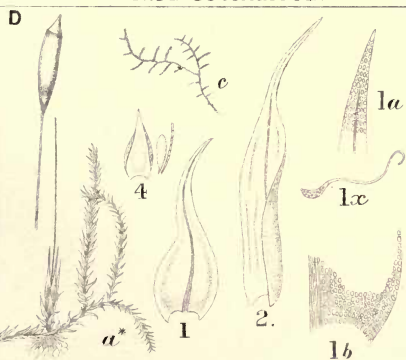
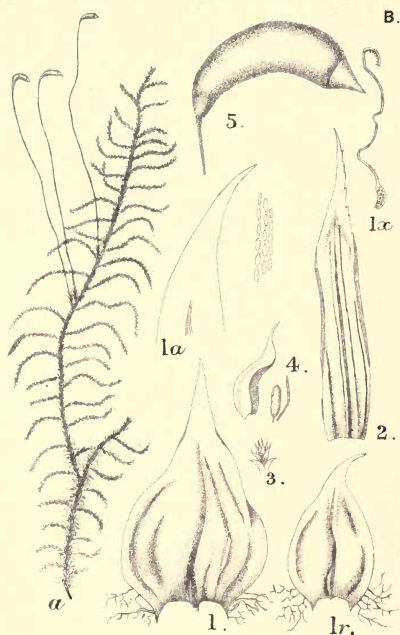
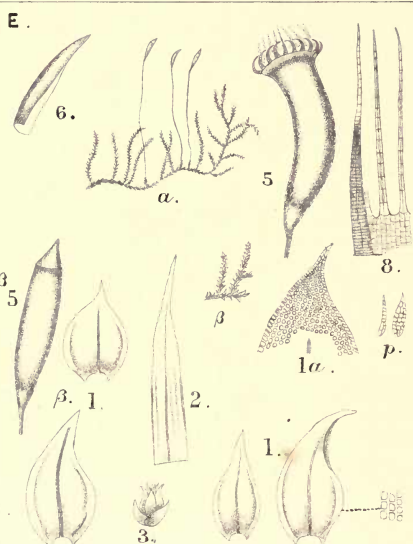
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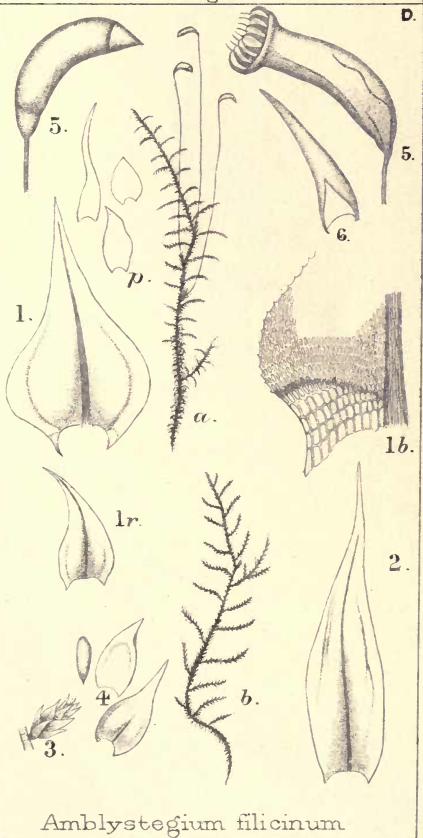
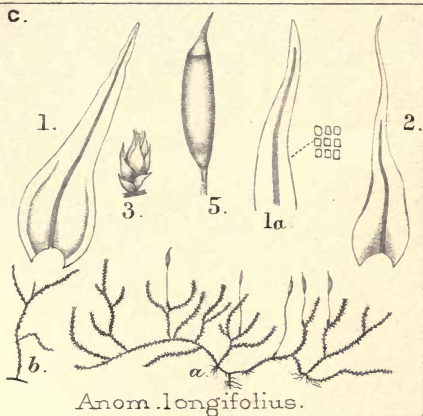
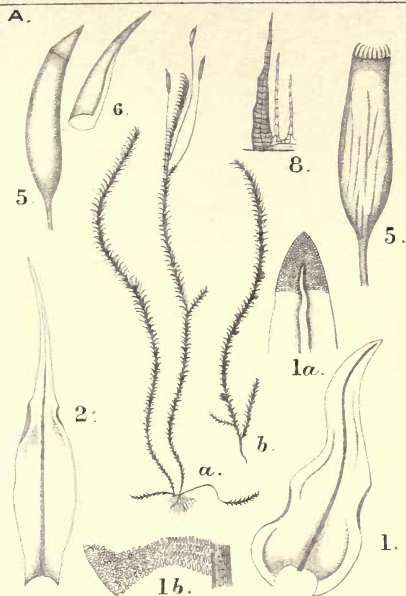




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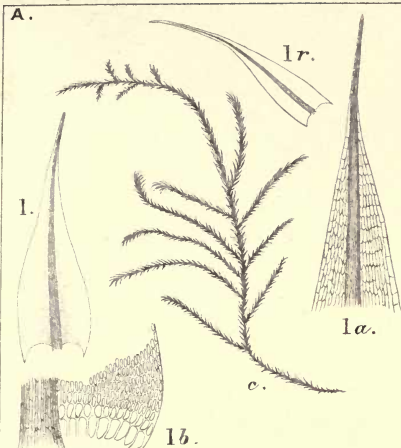
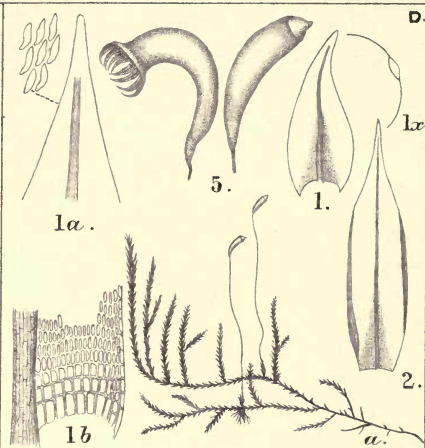
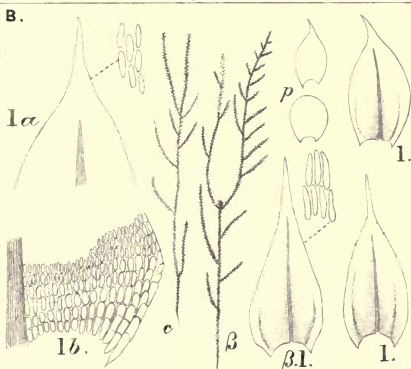
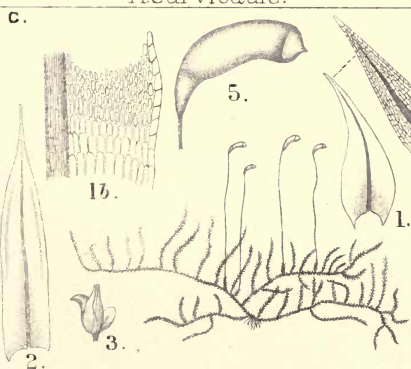
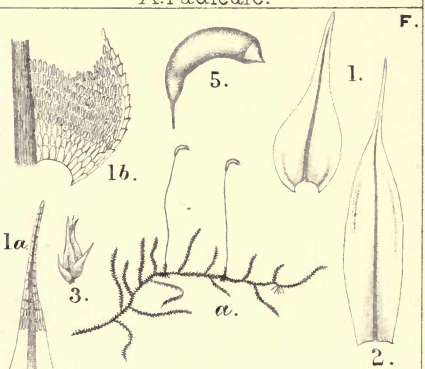




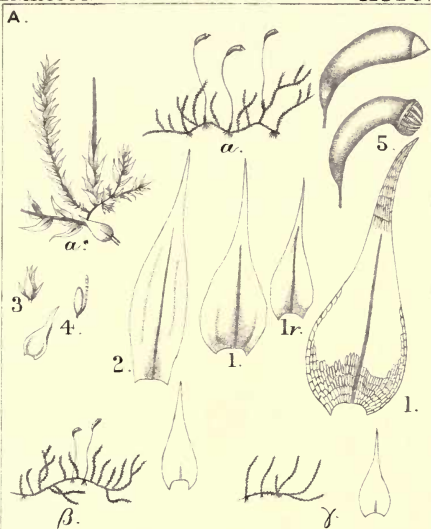
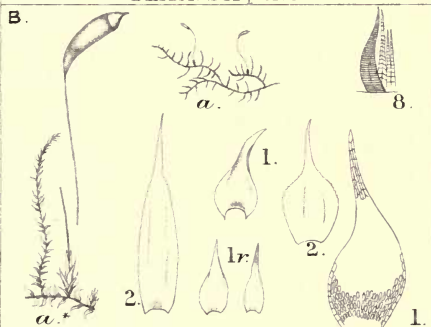
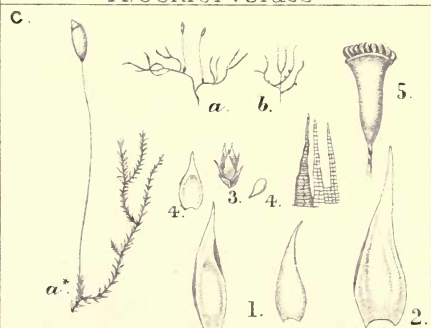
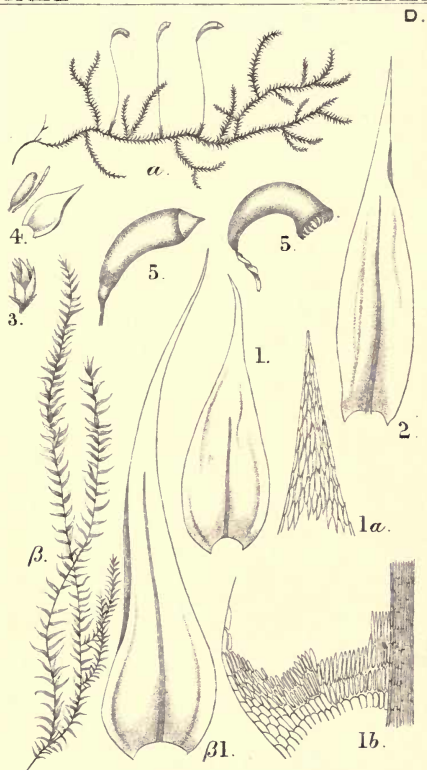
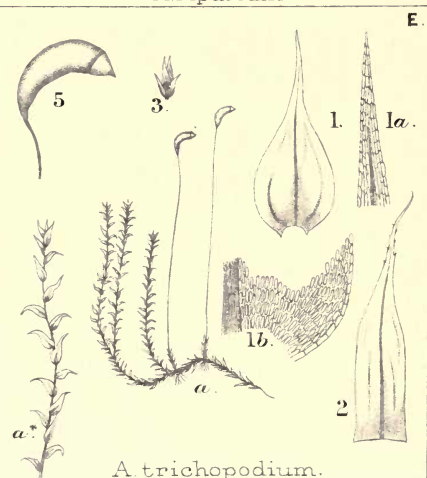






*Amblystegium fallax.**A. fluviatile.**A. curvicaule.**A. radicale.**A. irriguum.**A. varium.*



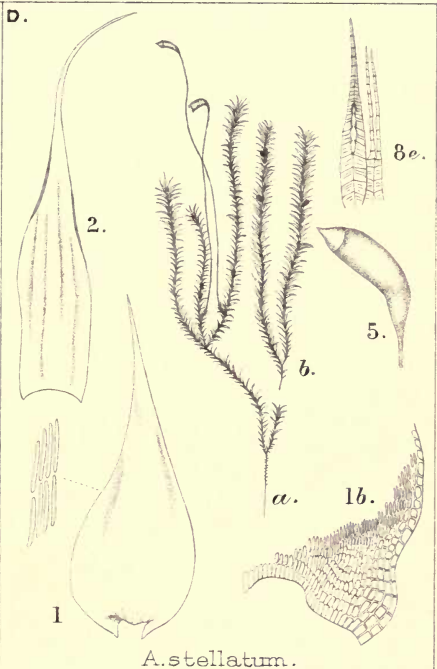
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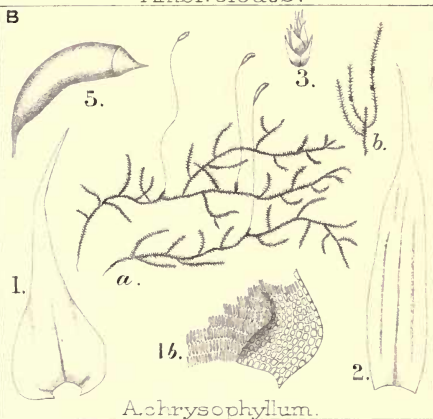


D.



A.stellatum.

E.



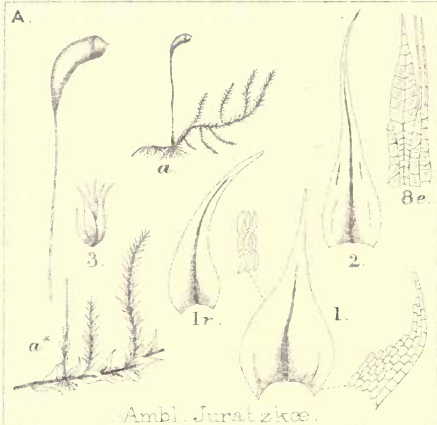
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Apolygamum.

Aprotensum.

A.polygamum.





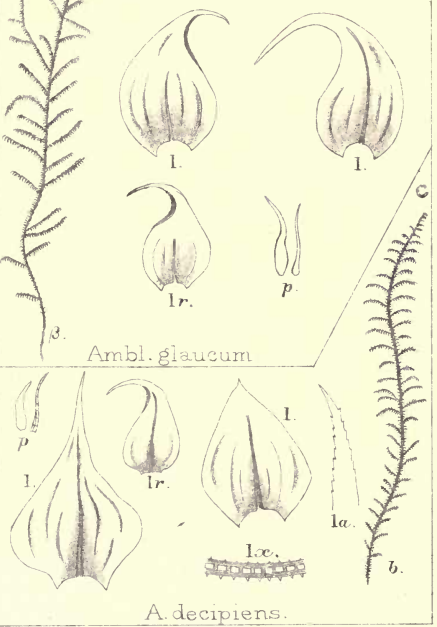
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*Amblyopodium glaucum.*



*Amblyopodium falcatum.*



*Amblyopodium decipiens.*

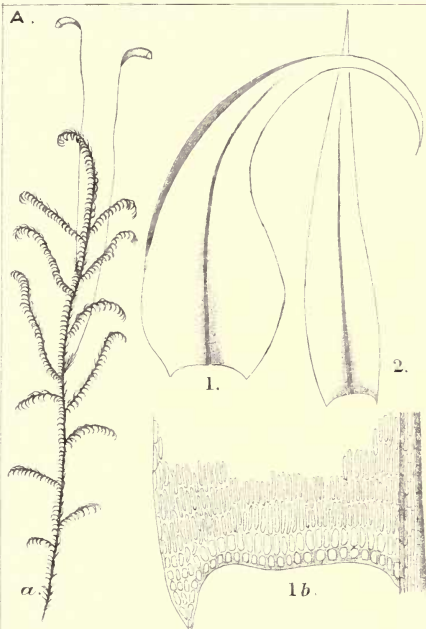
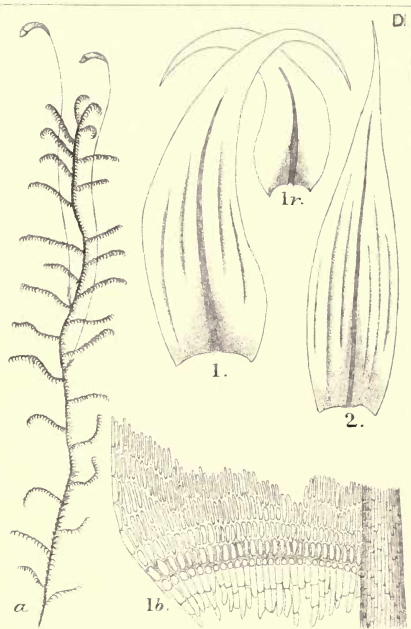
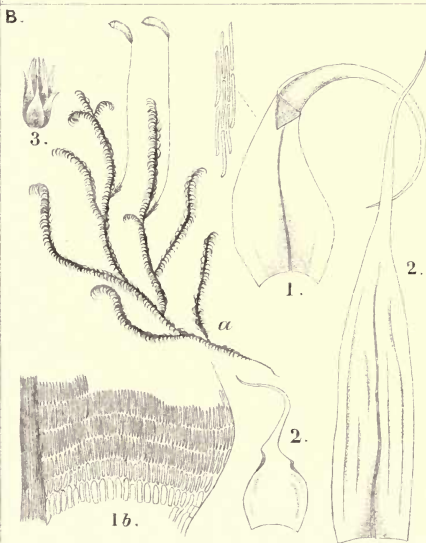
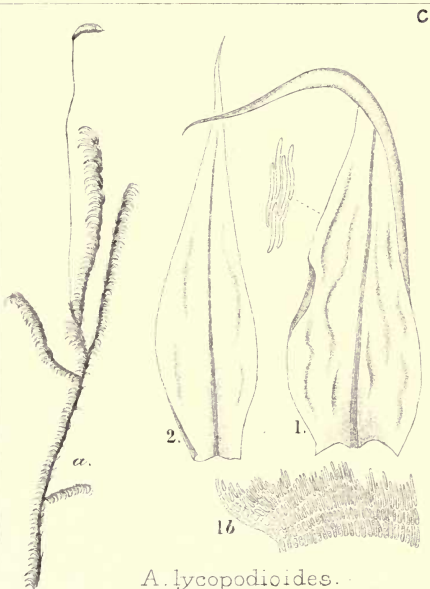




*Amblyopogon Sendtneri*.





*Amblyopogon intermedium.**Amblyopogon vernicosum.**Amblyopogon revolvens.**Amblyopogon lycopodioides.*

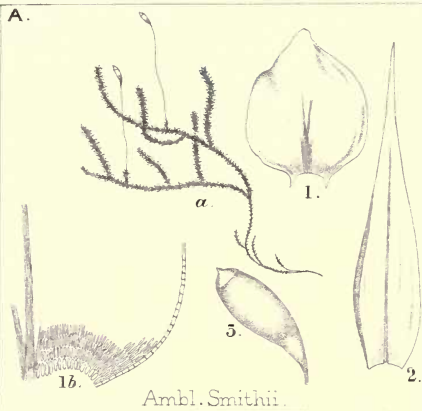
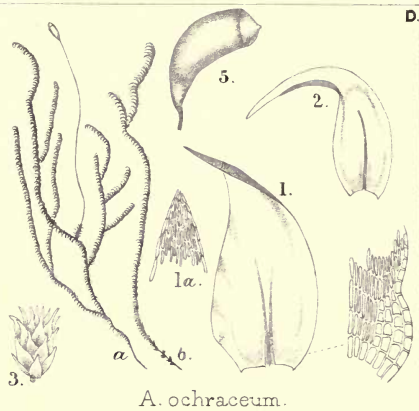
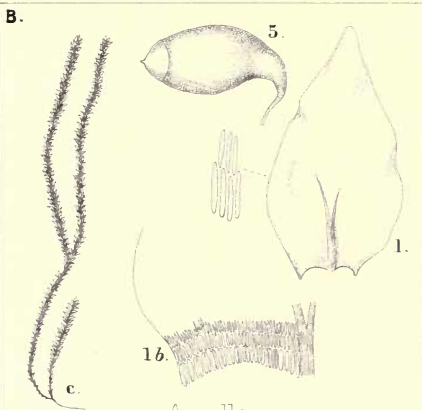
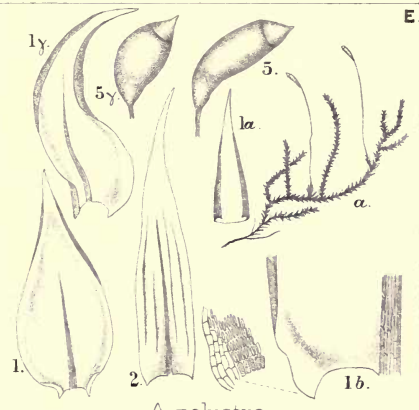
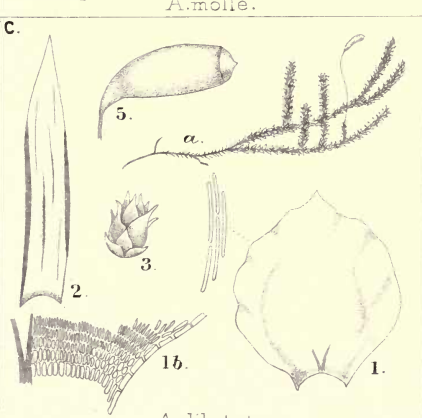
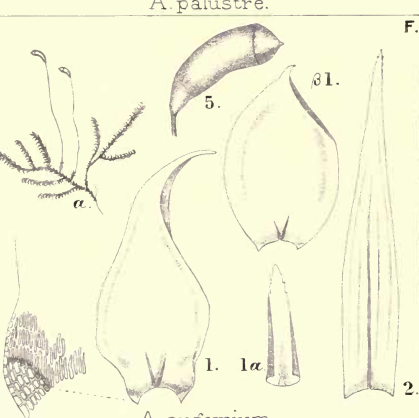




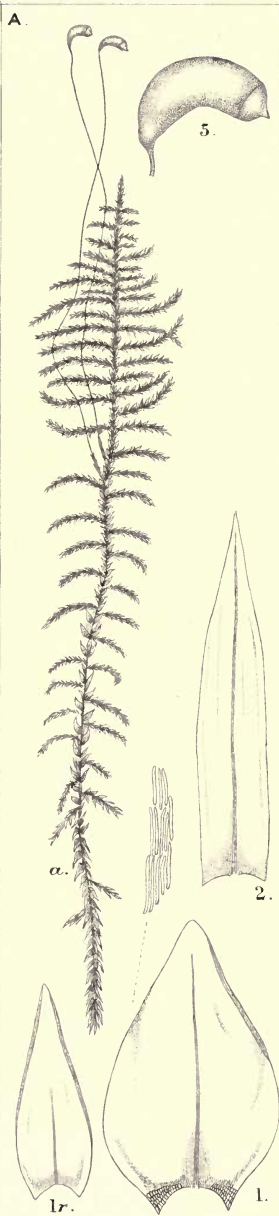
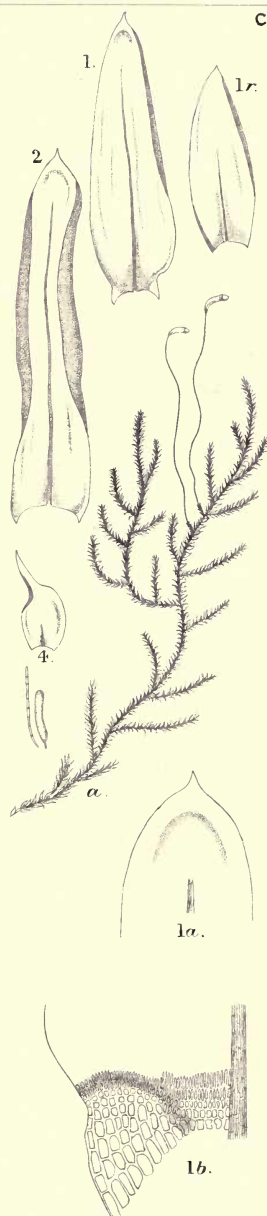




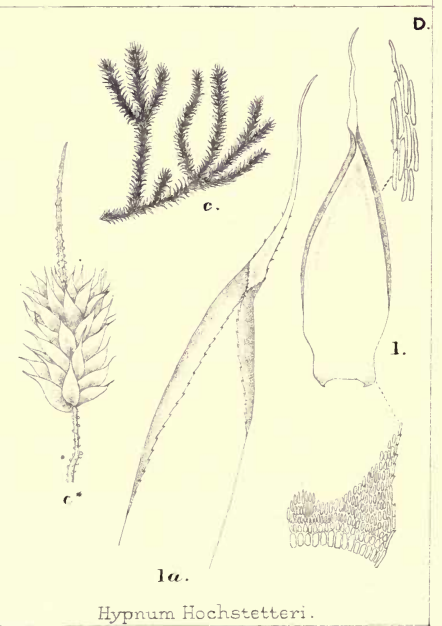
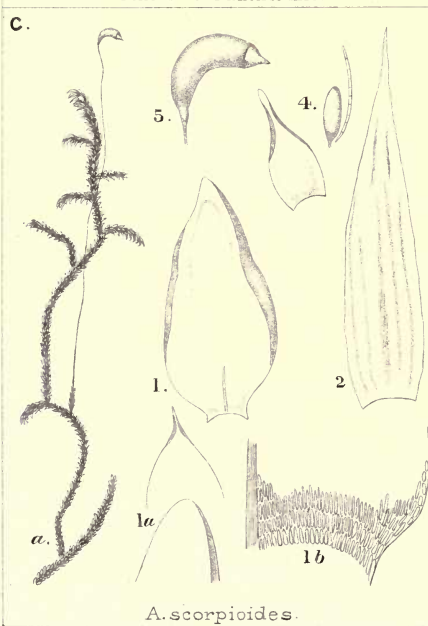
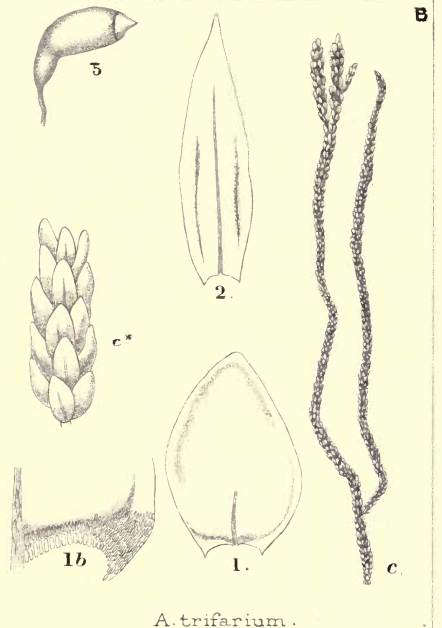
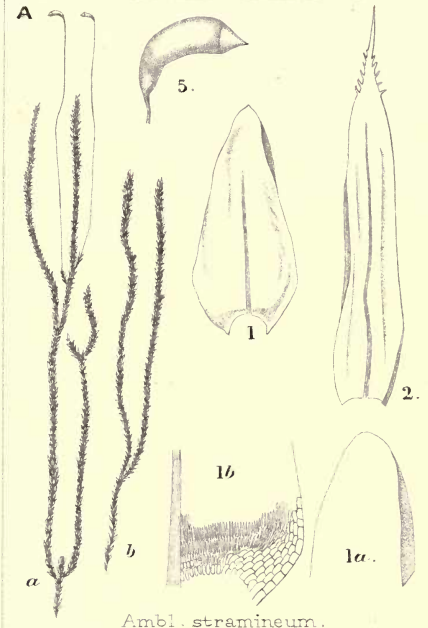


*Amblyopogon Smithii.**A. ochraceum.**A. molle.**A. palustre.**A. dilatatum.**A. eugyrium.*



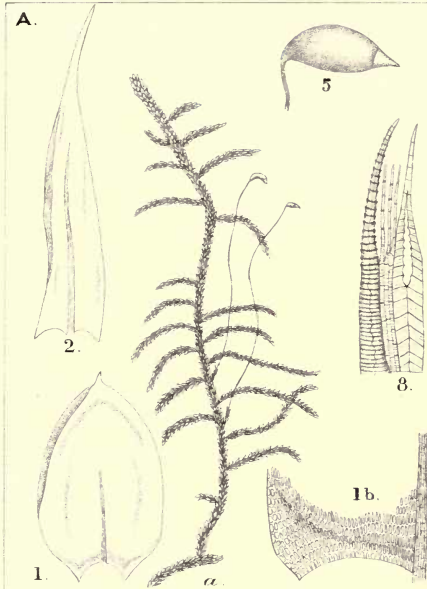
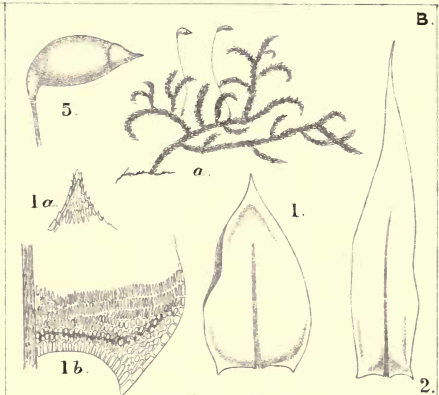
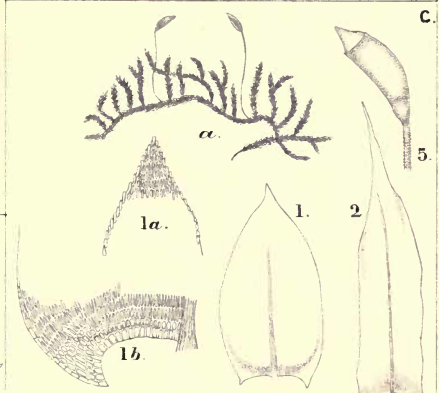
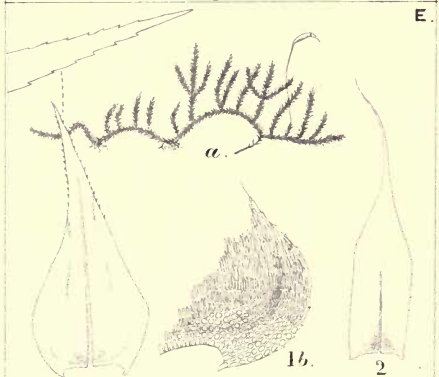
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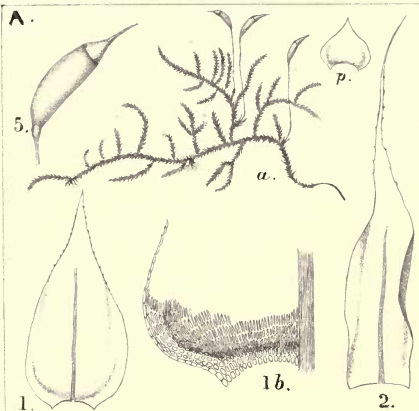
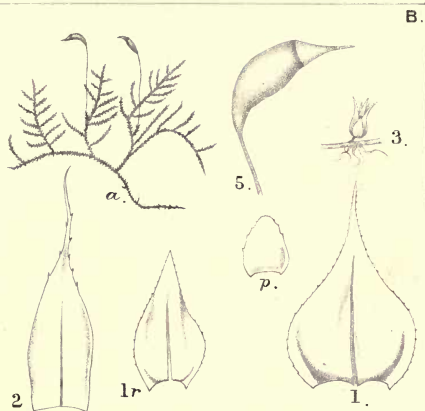
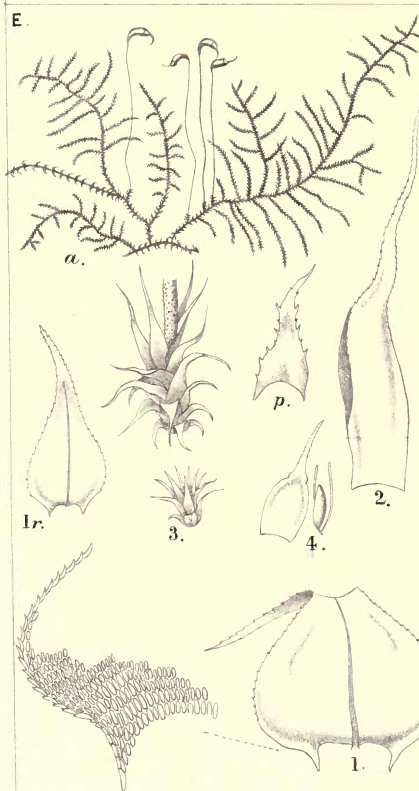
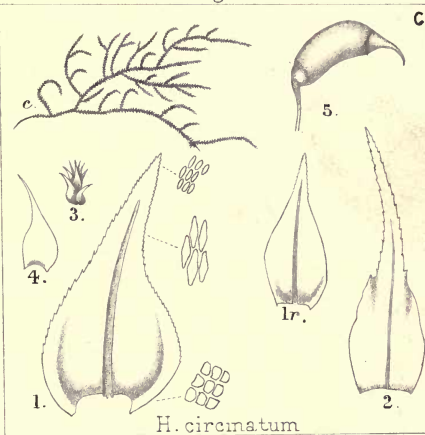
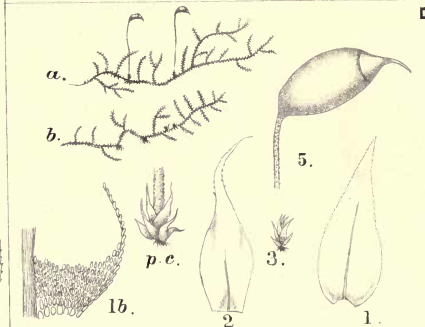






*Hypnum purum.**H. striatum.**H. illecebrum.**H. coespitosum.**H. meridionale.*



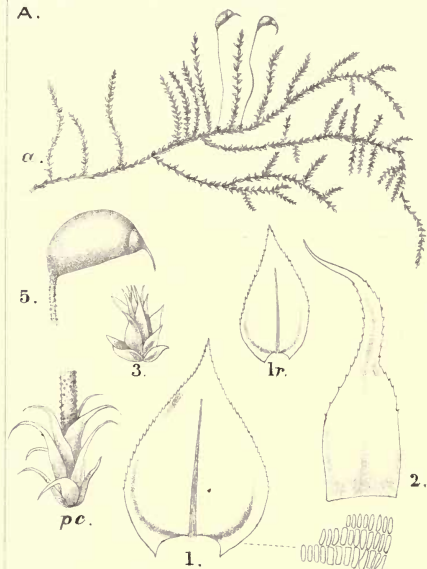
*H. striatum.**H. strigosum.**H. praelongum.**H. circinatum**H. pallidirostre.*



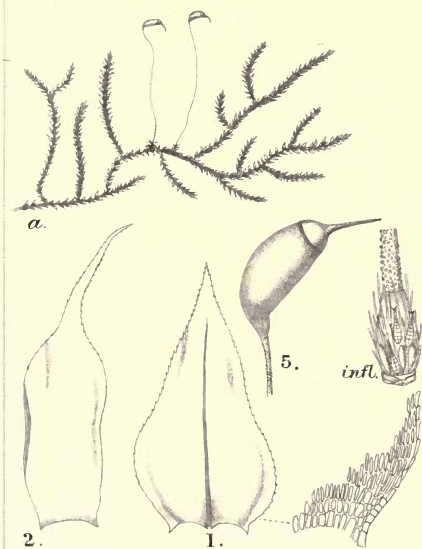




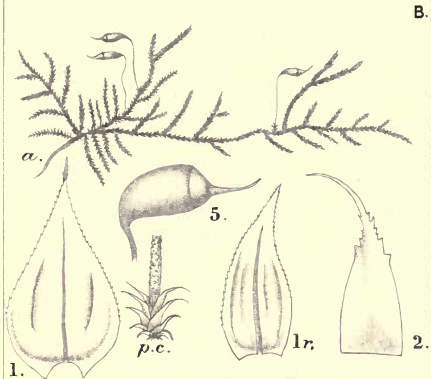
A.

*Hypnum Swartzii.*

C.

*H. speciosum.*

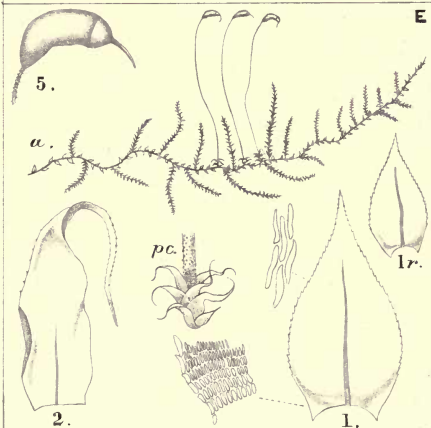
B.

*H. Schleicheri.*

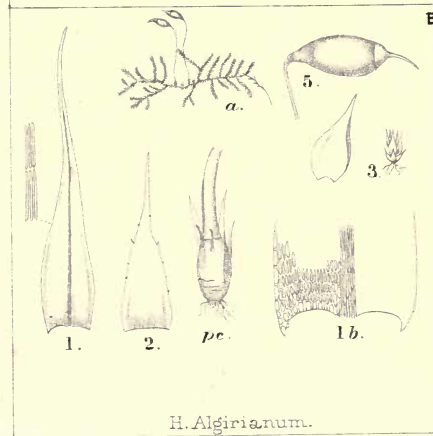
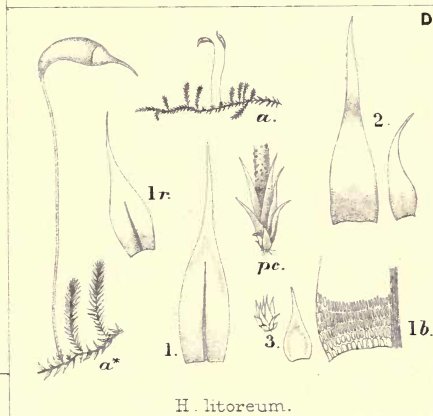
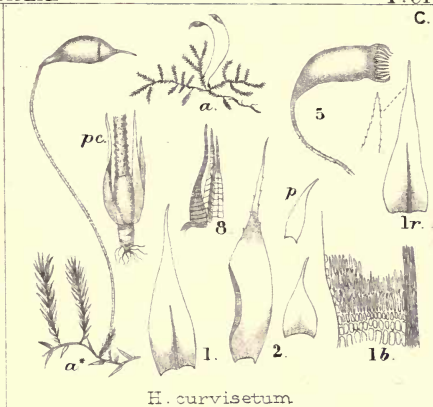
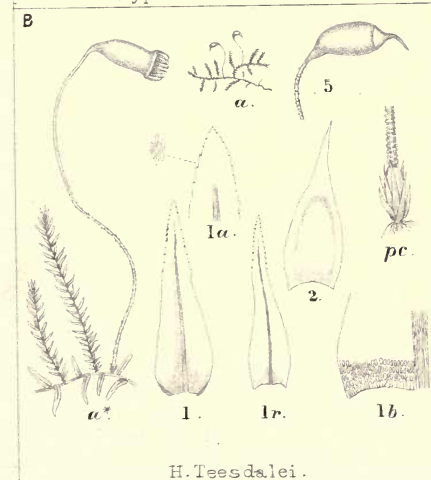
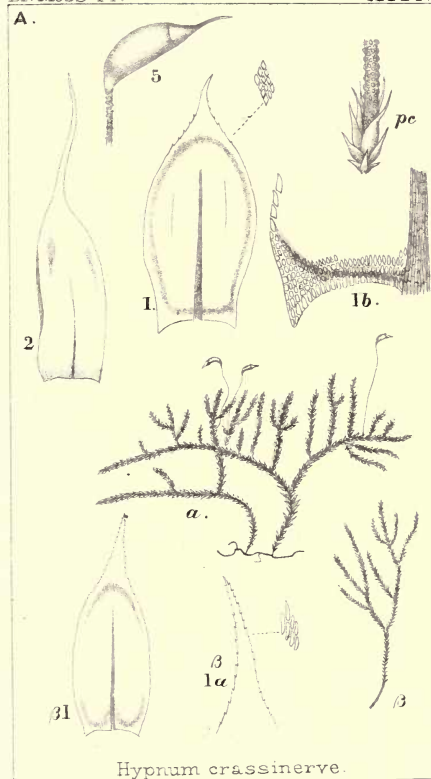
D.

*H. hians.*

E.

*H. distans.*





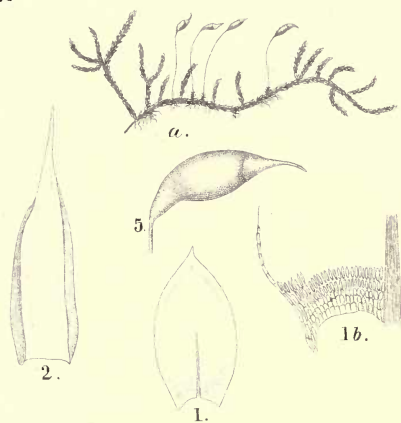






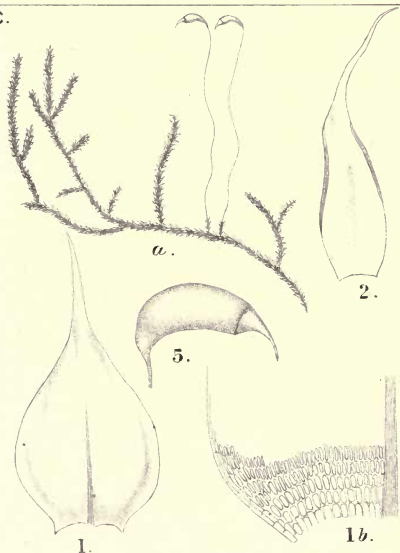


**A**



Hypnum murale.

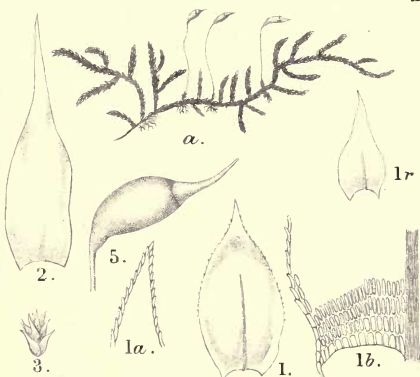
C.



H. Megapolitanum.

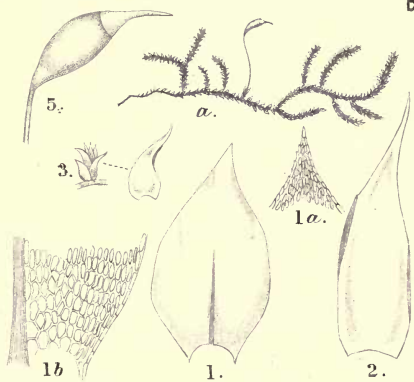
*R. Bruthwaite ad nat. delt.*

B



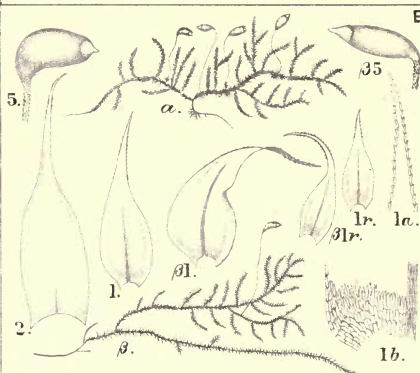
H.confertum.

D



H.rotundifolium.

□



H. velutinum.

Mintern Bros. Inc.



A detailed botanical illustration of *H. pseudoplumosum*. The drawing includes several labeled parts:
 

- 1.** A large, ovate leaf with a prominent midrib and a long, acuminate tip.
- 2.** A smaller, similar leaf, also ovate with a long tip.
- 3.** A small, bell-shaped flower or fruit hanging from a short pedicel.
- 4.** A long, slender, pointed structure, possibly a style or a young fruit.
- 5.** A small, rounded, somewhat pear-shaped fruit or seed.
- 6.** A long, narrow, pointed structure, similar to 4.
- 7.** A branch of the plant showing several small, bell-shaped flowers or fruits hanging from the leaf axils.
- 8.** A close-up view of the base of a flower or fruit, showing the attachment point and surrounding structures.
- 9.** A branch of the plant showing several small, bell-shaped flowers or fruits hanging from the leaf axils, similar to 7 but with different proportions.
- 10.** A close-up view of the base of a flower or fruit, showing the attachment point and surrounding structures, similar to 8.

A detailed botanical illustration of *H. Starkei*. The drawing includes several labeled parts:
 

- 1.**: A large, elongated, teardrop-shaped structure, likely a bract or sepal, with a central longitudinal vein.
- 2.**: A long, slender, curved structure, possibly a petal or style.
- 5.**: A small, curved, hook-like structure.
- 1r.**: A smaller, teardrop-shaped structure, similar to 1 but smaller.
- p.**: A small, curved structure, possibly a petal or sepal.
- 1b.**: A detailed view of a plant part showing a grid-like cellular structure, likely a cross-section of a leaf or stem.
- a.**: A branch with several small, upright, spiky structures, possibly stamens or inflorescences.

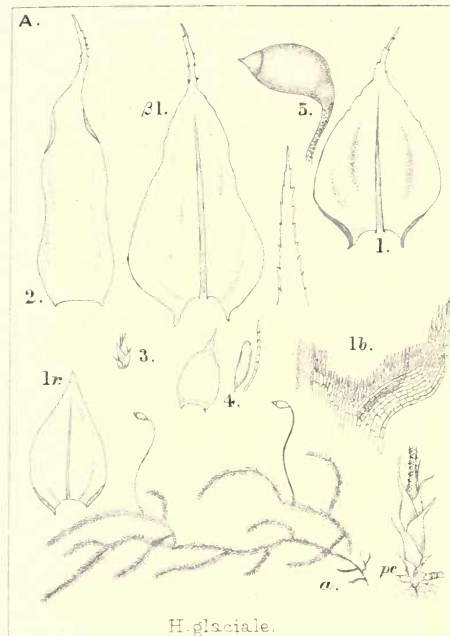
*H. albicans.*

*H. reflexum.*

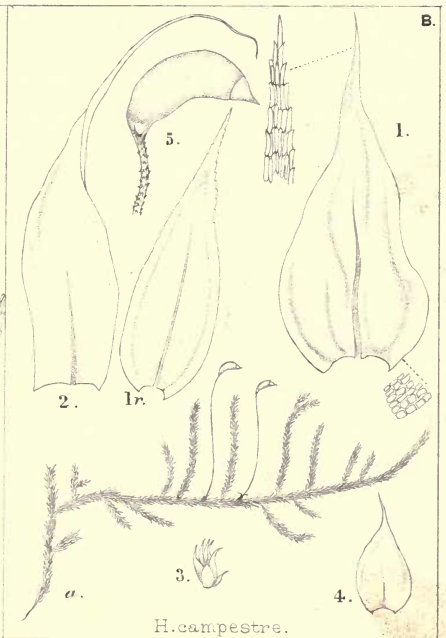




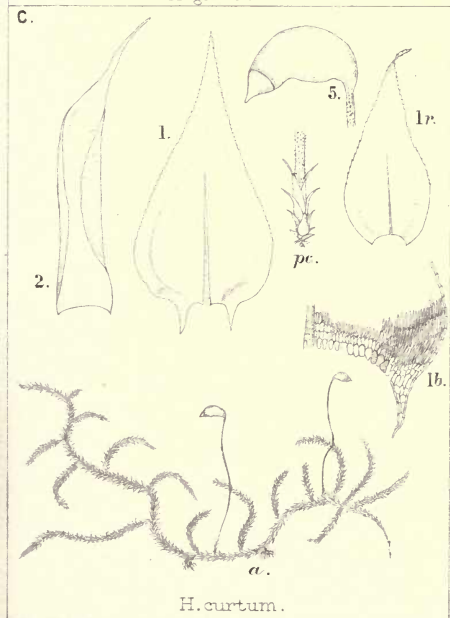




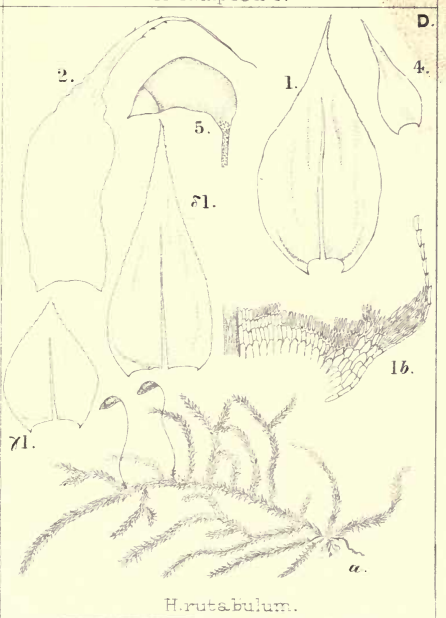
H. glaciale.



H.campestre.

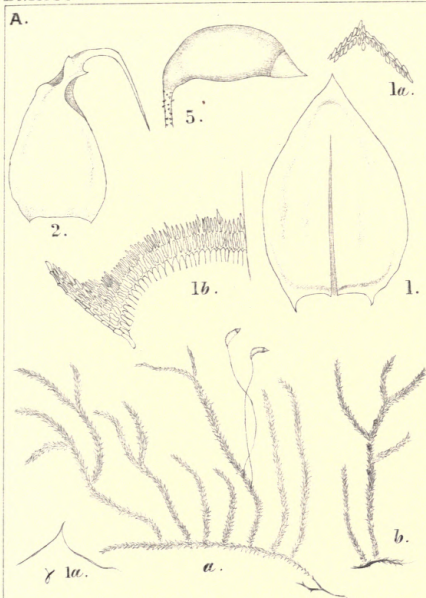


H. curtum.

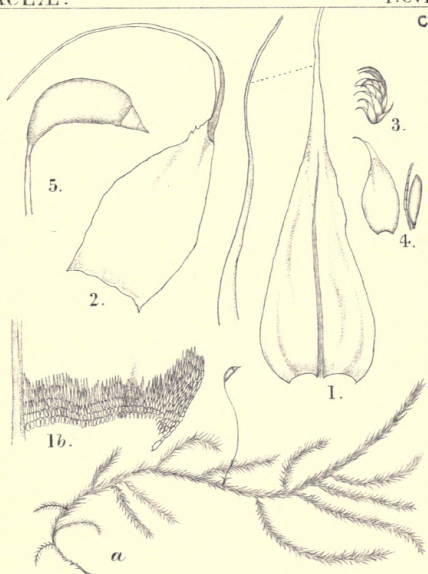


H.rutabulum.

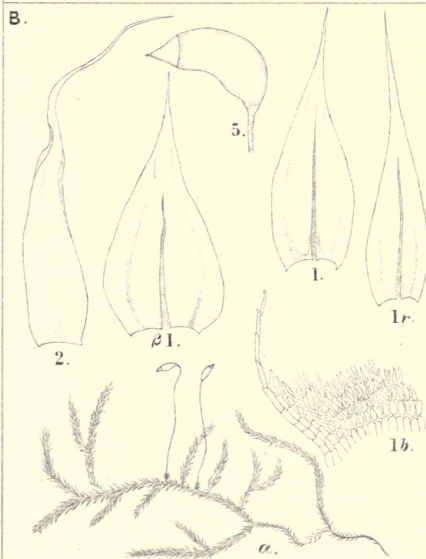




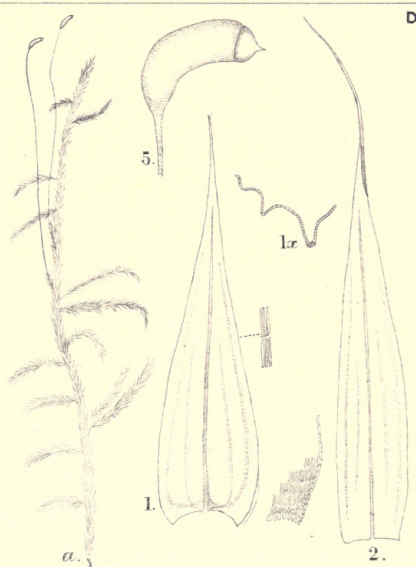
H. rivulare.



H. glareosum.



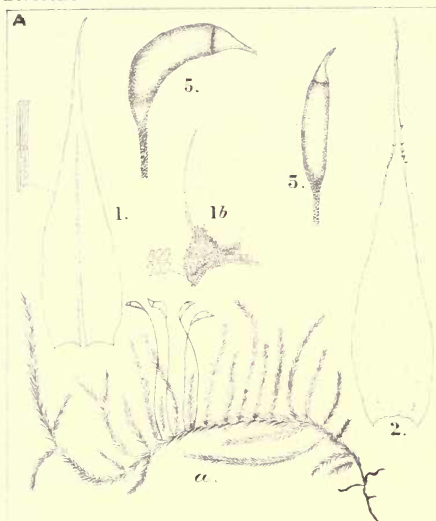
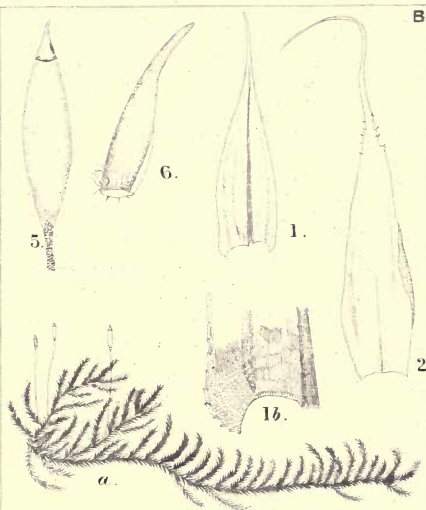
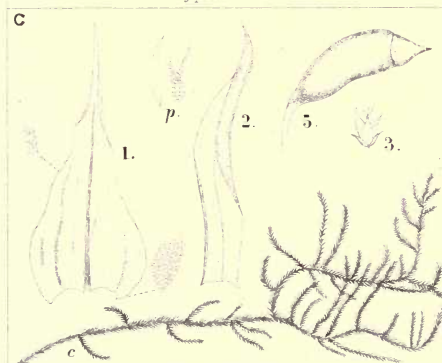
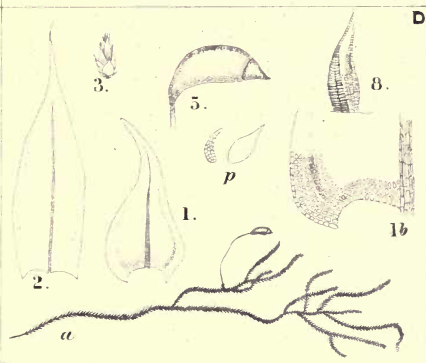
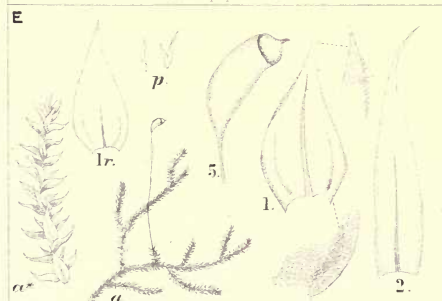
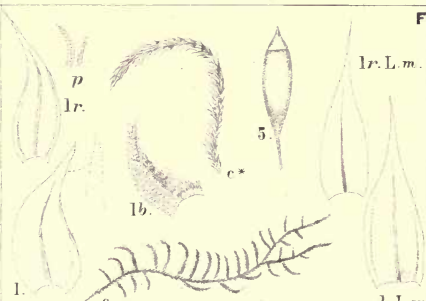
H. plumosum.



H. trichoides.

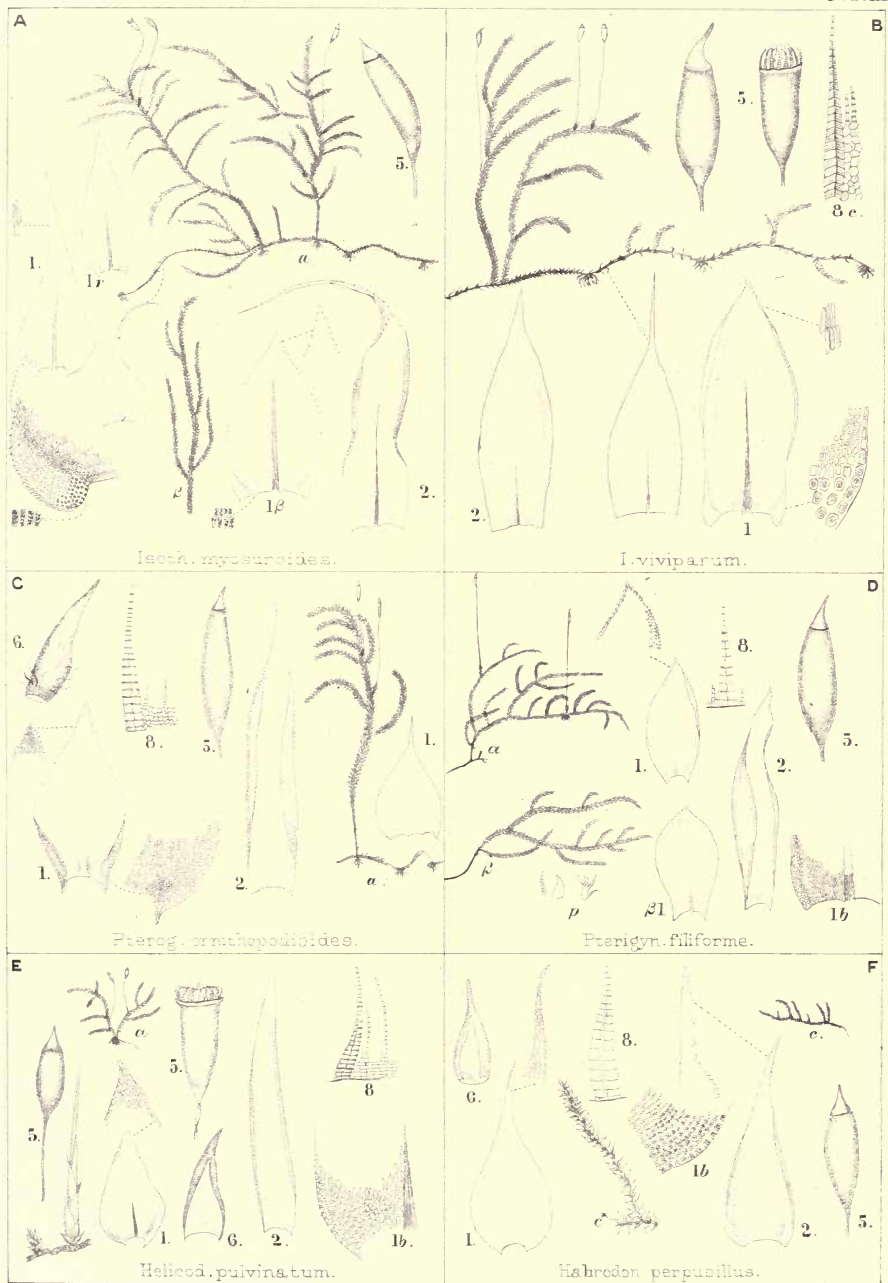




*Hypnitescens.**H. sericeum.**Lesq. plicata.**L. filamentosa.**L. atro-virens.**L. saxicola.*







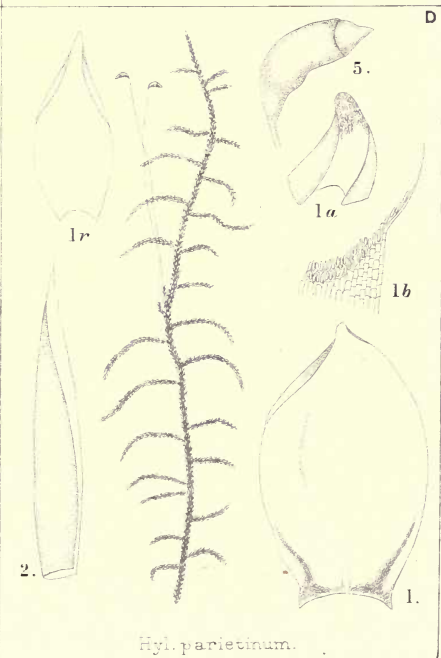
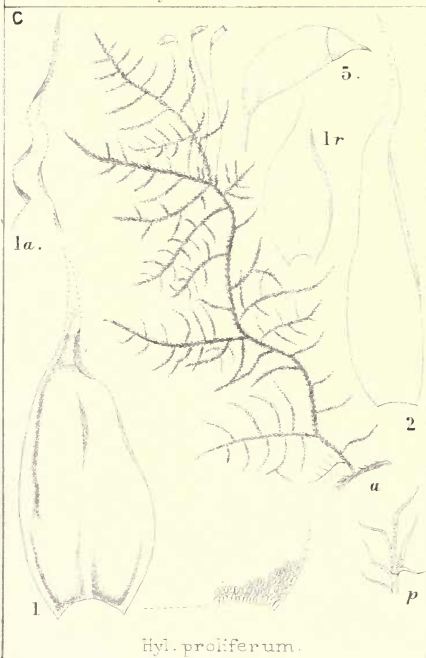
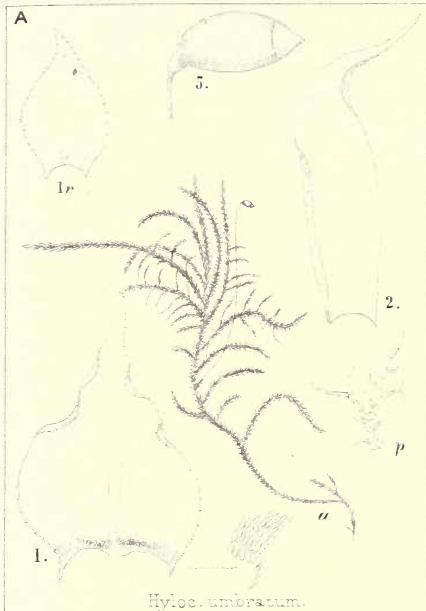




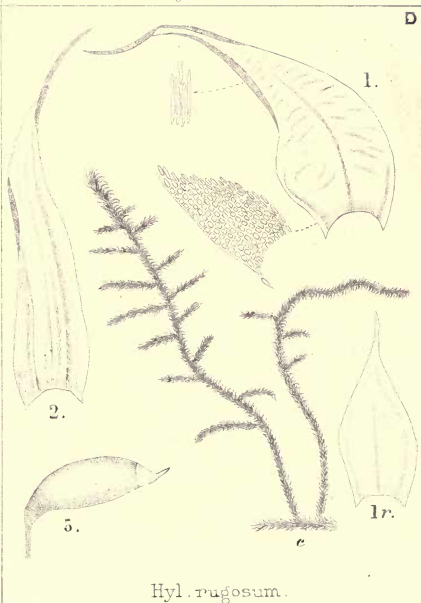
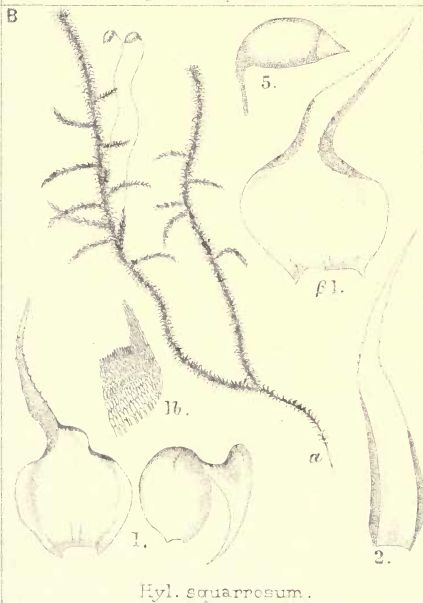
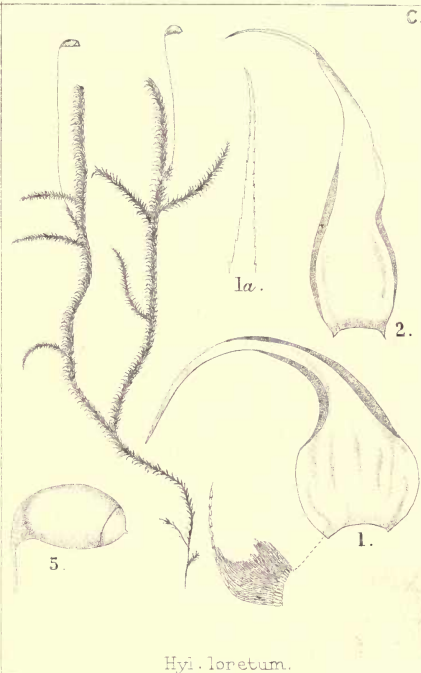




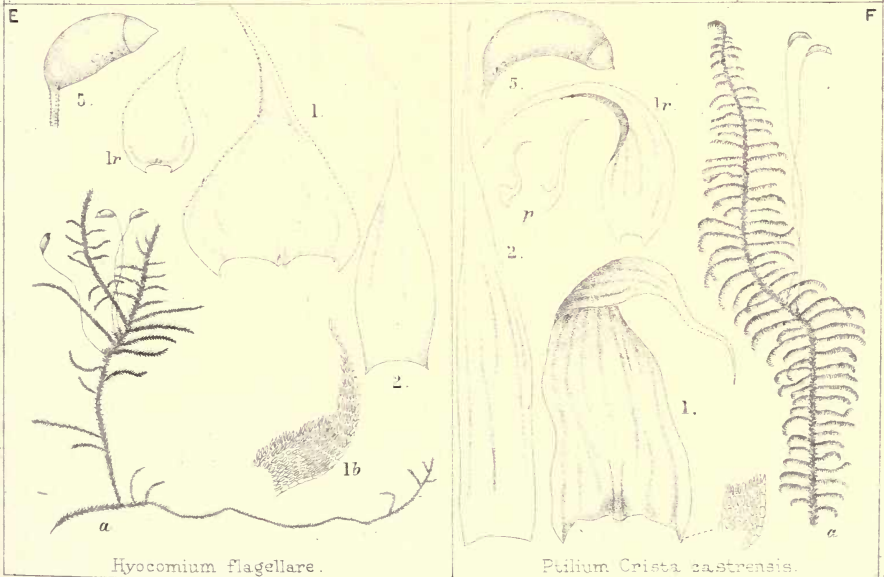
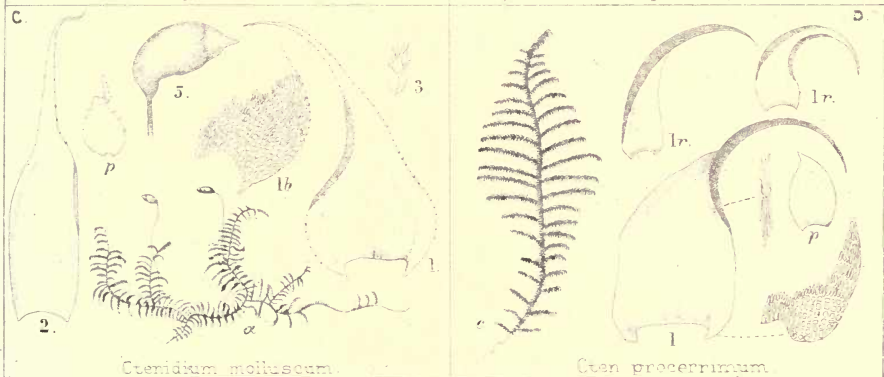
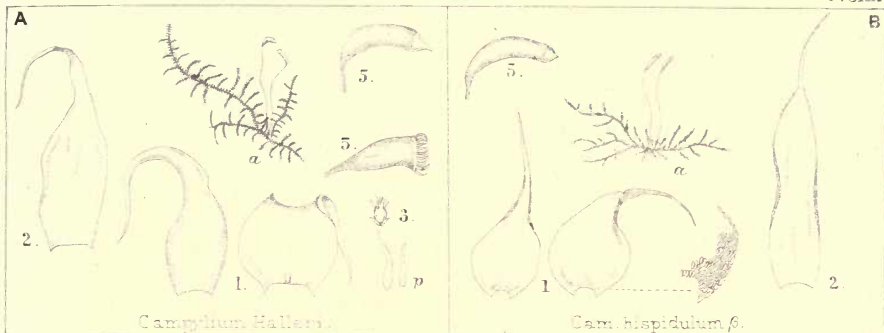








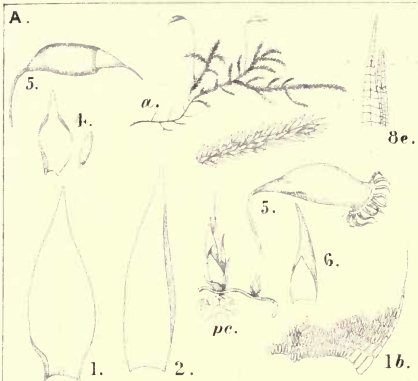






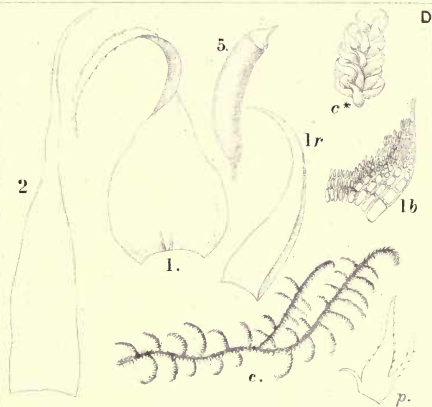


**A**



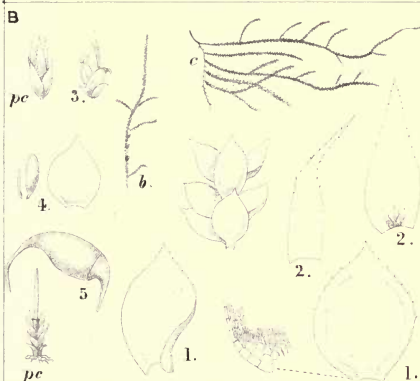
Semat. demissum.

D



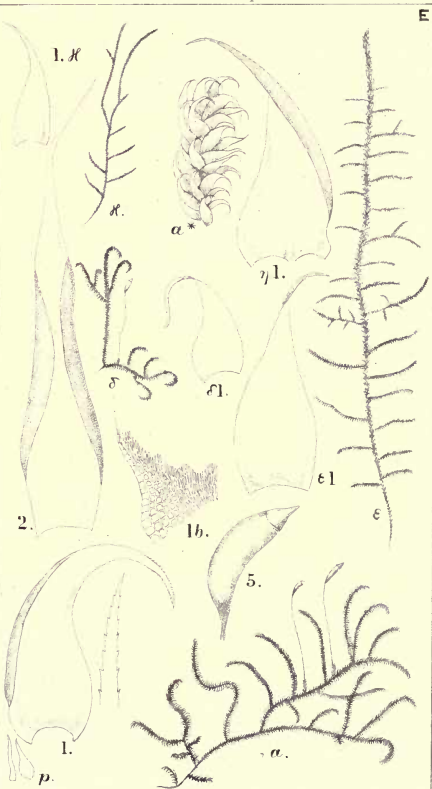
*Stereodon imponens*

**B**



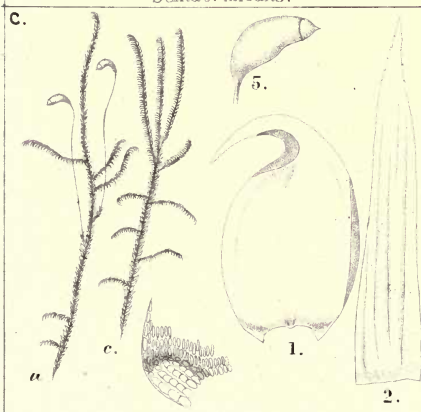
Semat. micans.

E



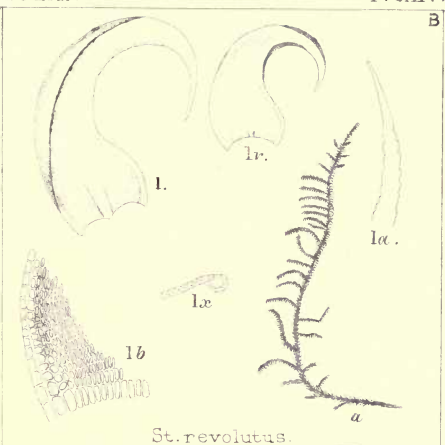
*Ster. cupressiformis.*

C.

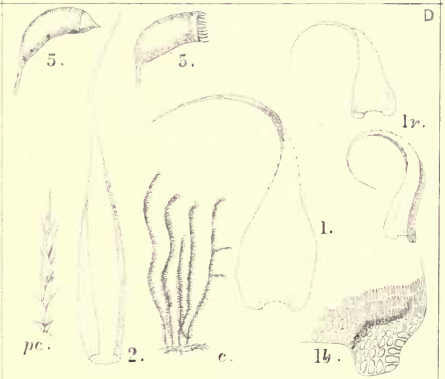


Ster. Lindbergii.

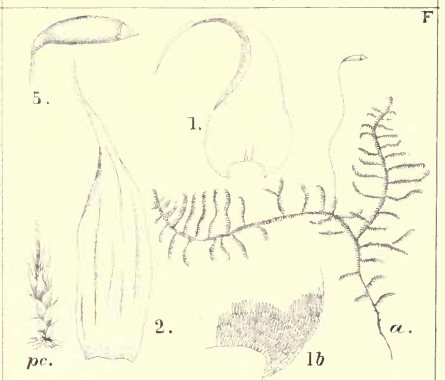




St. revolutus.



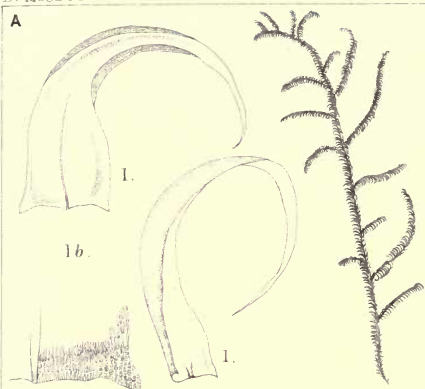
*St. circinalis*.



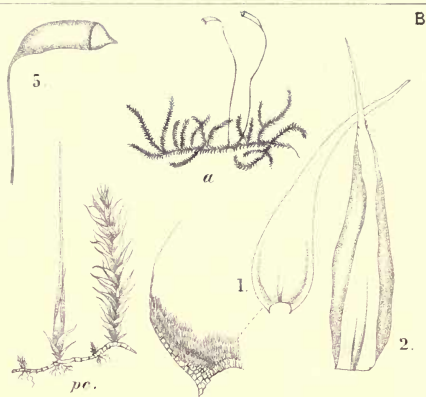
St. hamulosus.



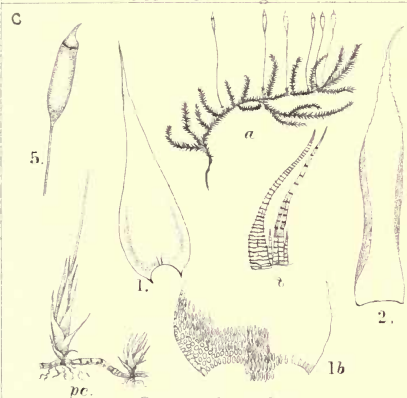




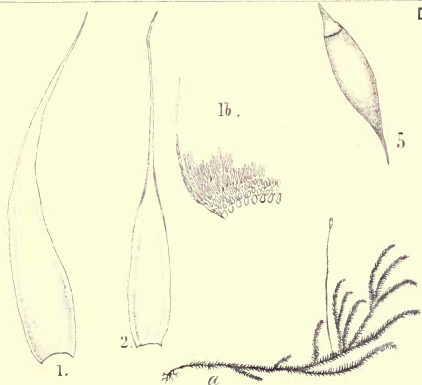
*Ster. Bambergeri.*



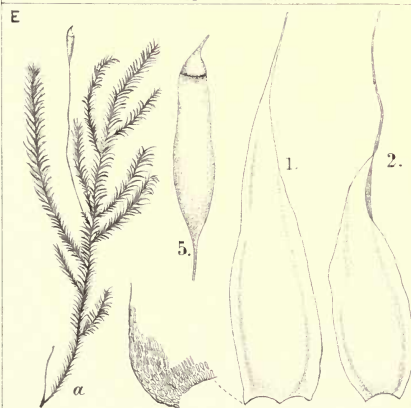
*Ster. incurvatus.*



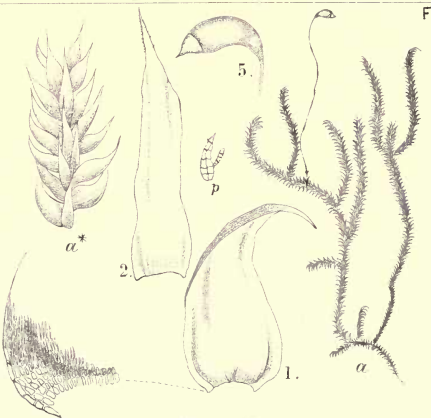
*Ster. polyanthes.*



*Ster. subrufus.*

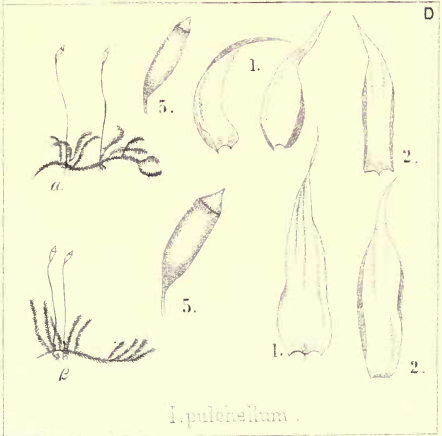
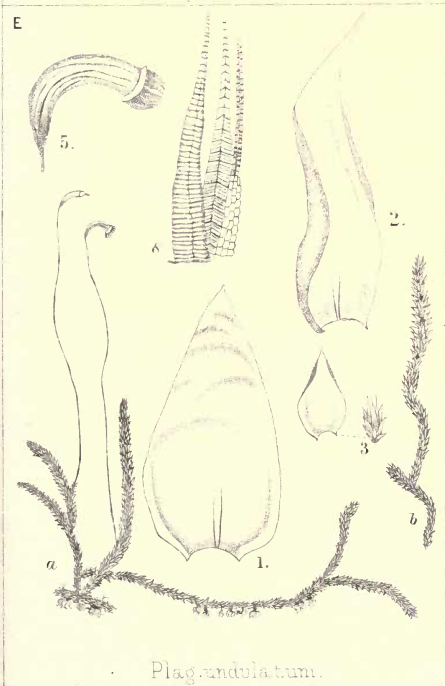
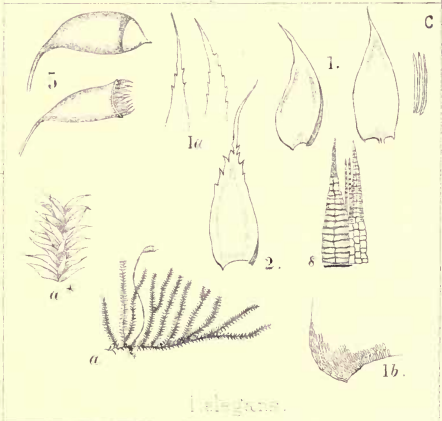
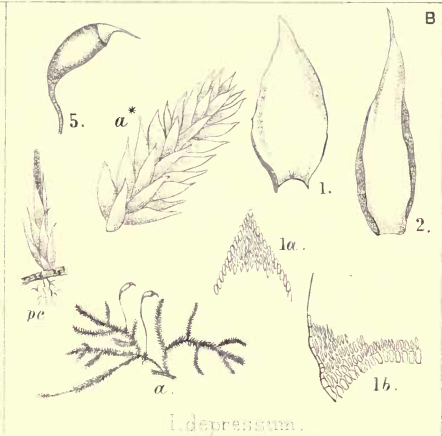
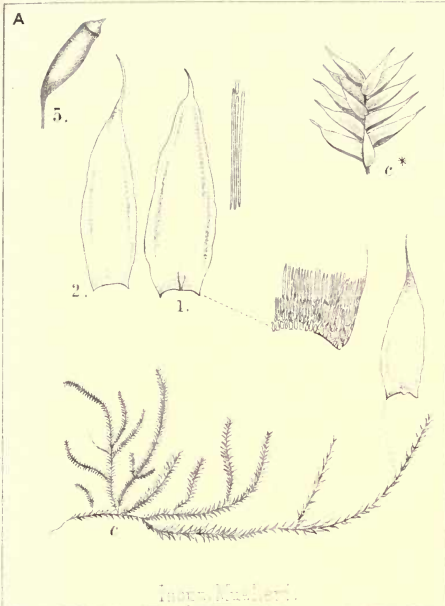


*Ster. rufescens.*



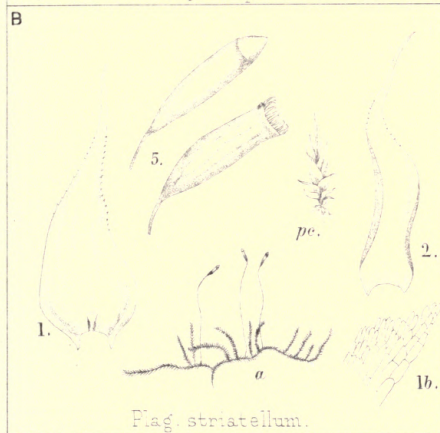
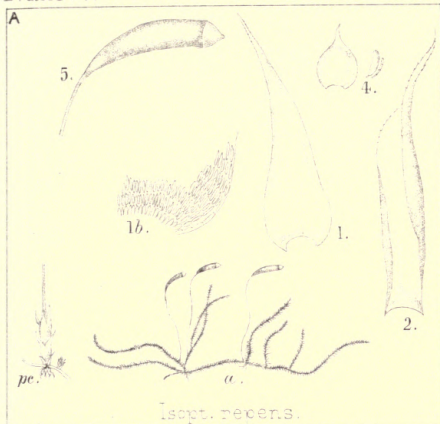
*Isopt. pratense.*



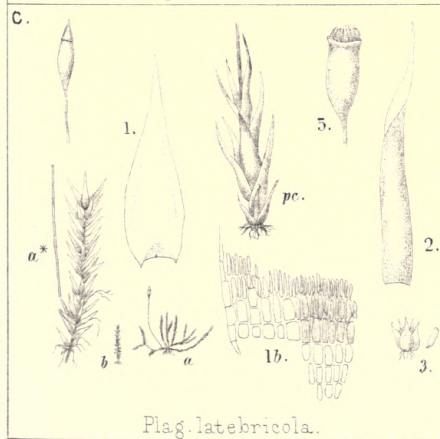




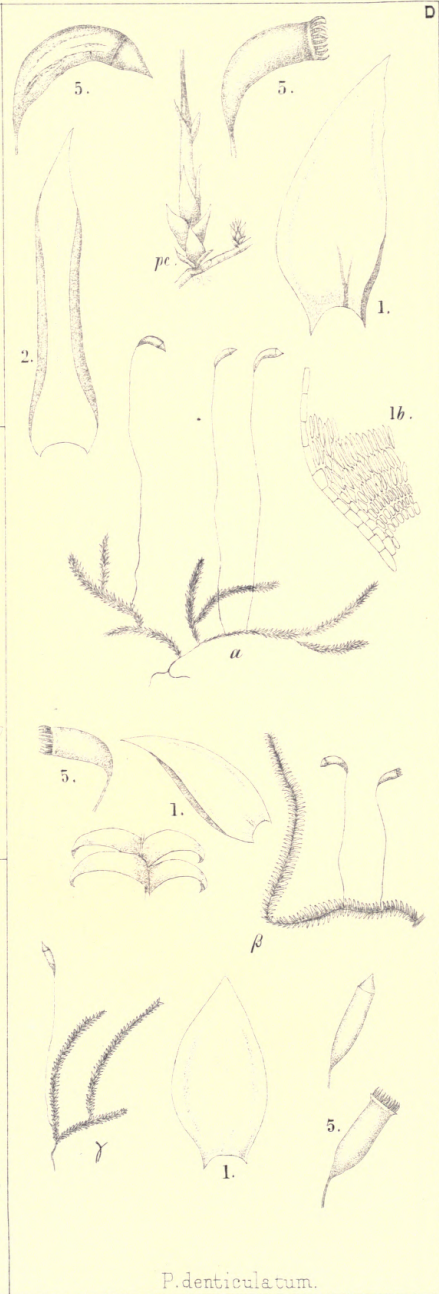




Plag. striatellum.



Plag. latebricola.

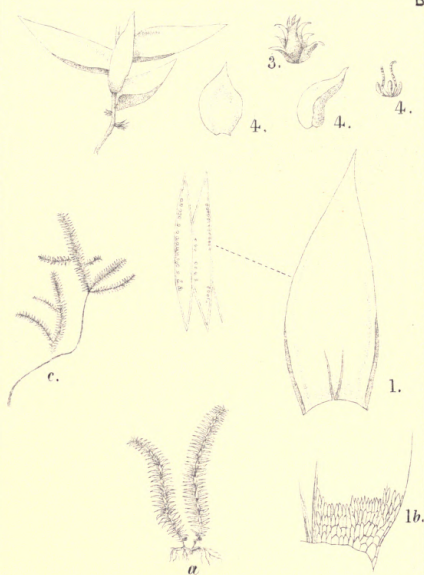


*P. denticulatum.*



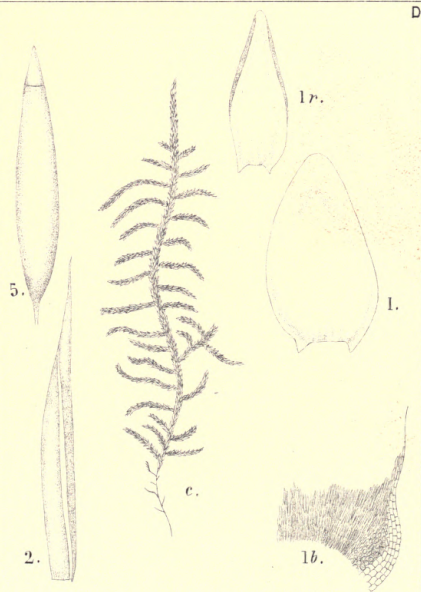


8



P. succulentum.

D

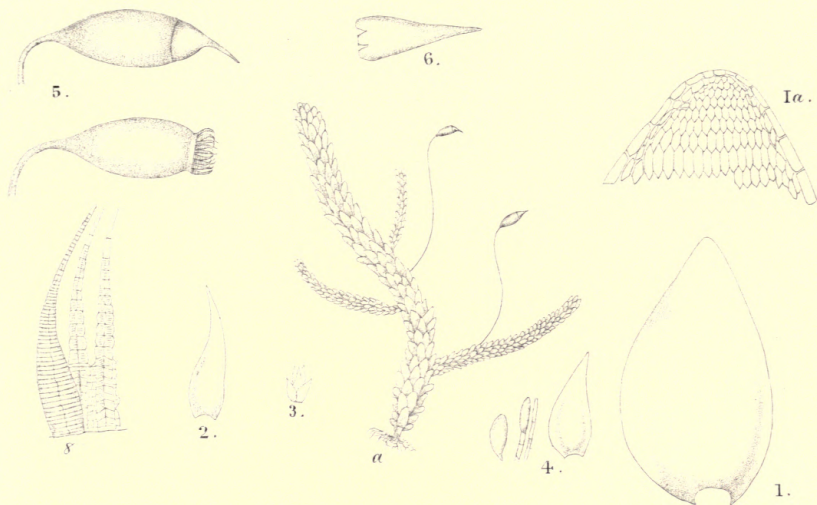


Entodon orthocarpus.



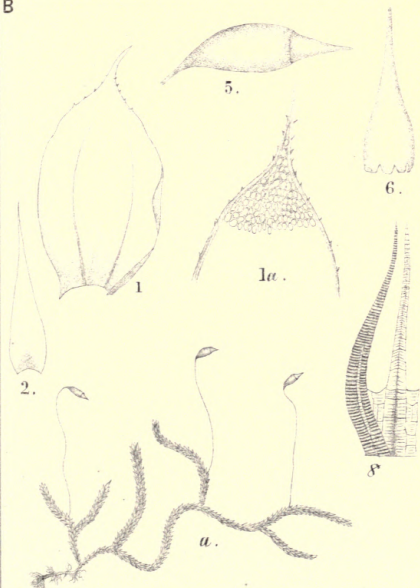


A



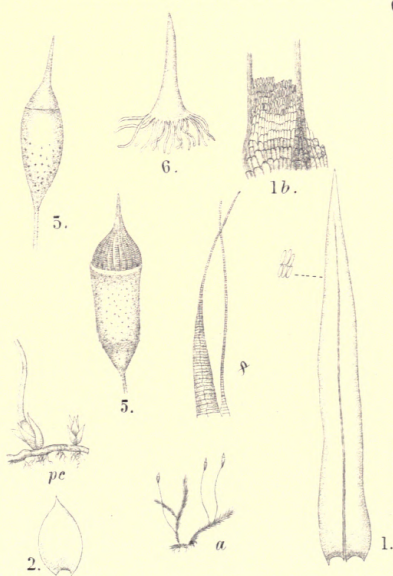
*Pterygophyllum lucens.*

B



*Cyclod. læte-virens.*

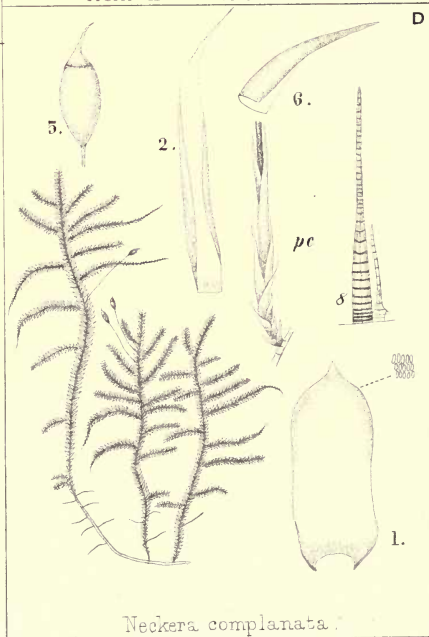
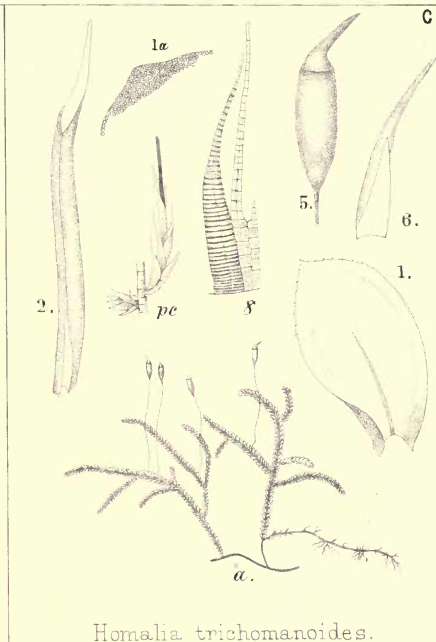
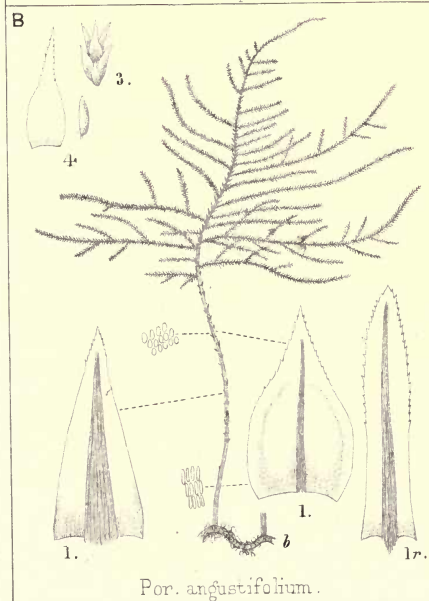
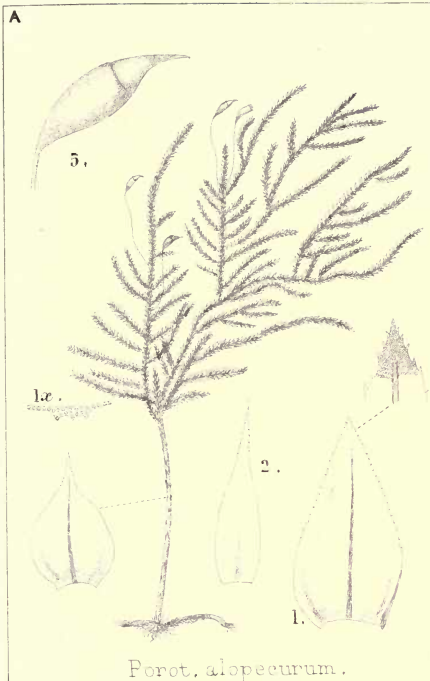
C



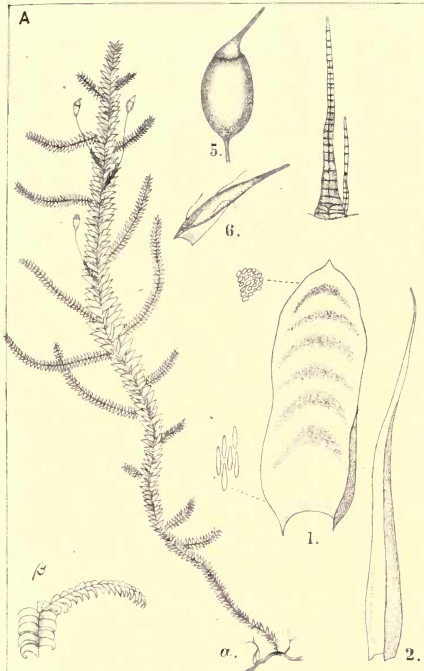
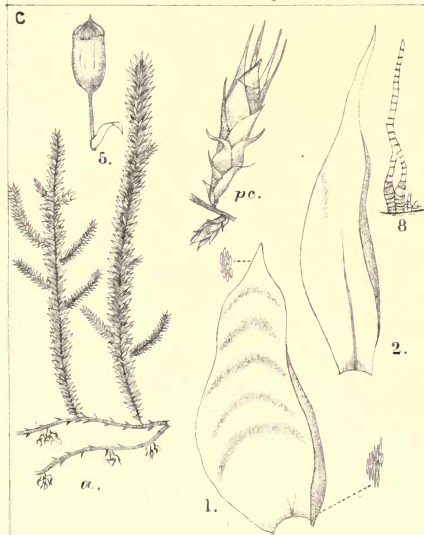
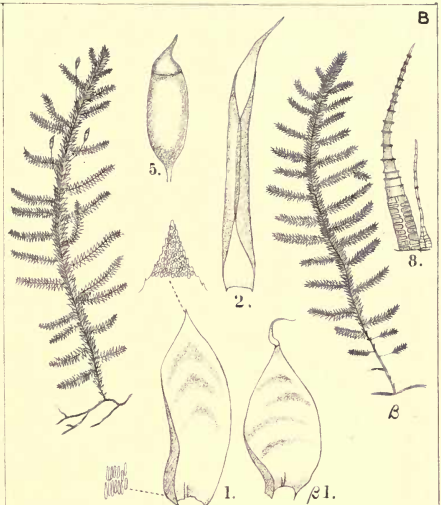
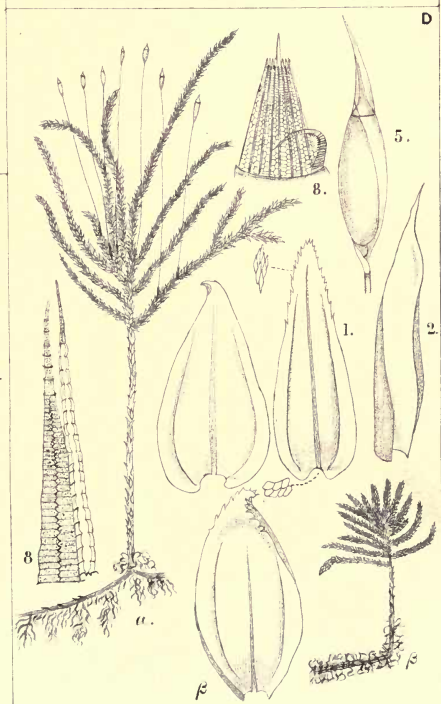
*Daltonia splachnoides.*





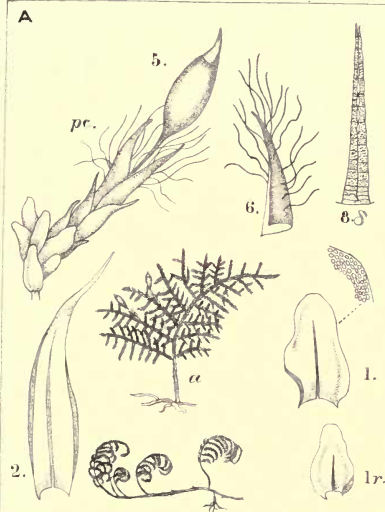




*Neckera crispa.**N. pennata.**N. fontinaloides.**Climacium dendroides.*



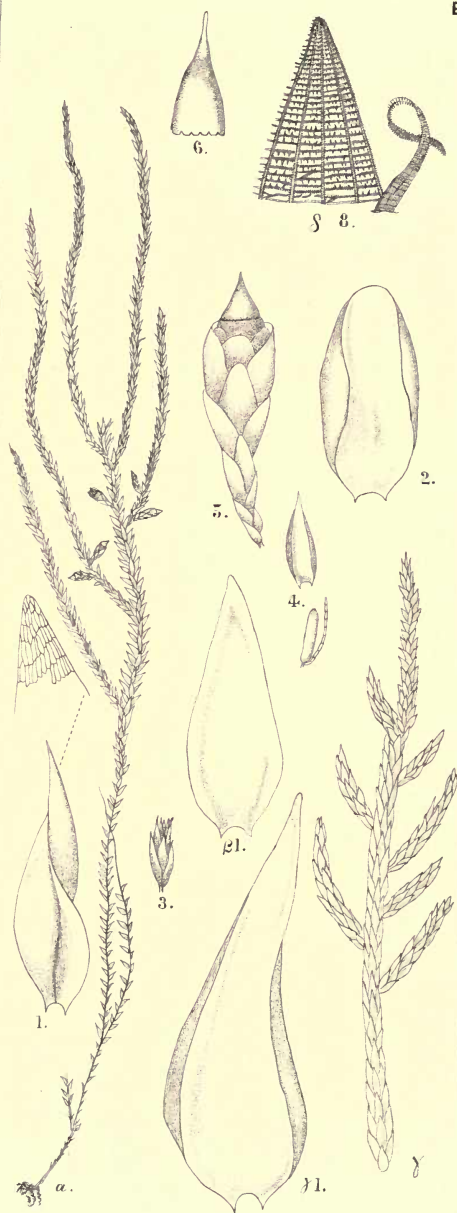




*Alsia Smithii.*

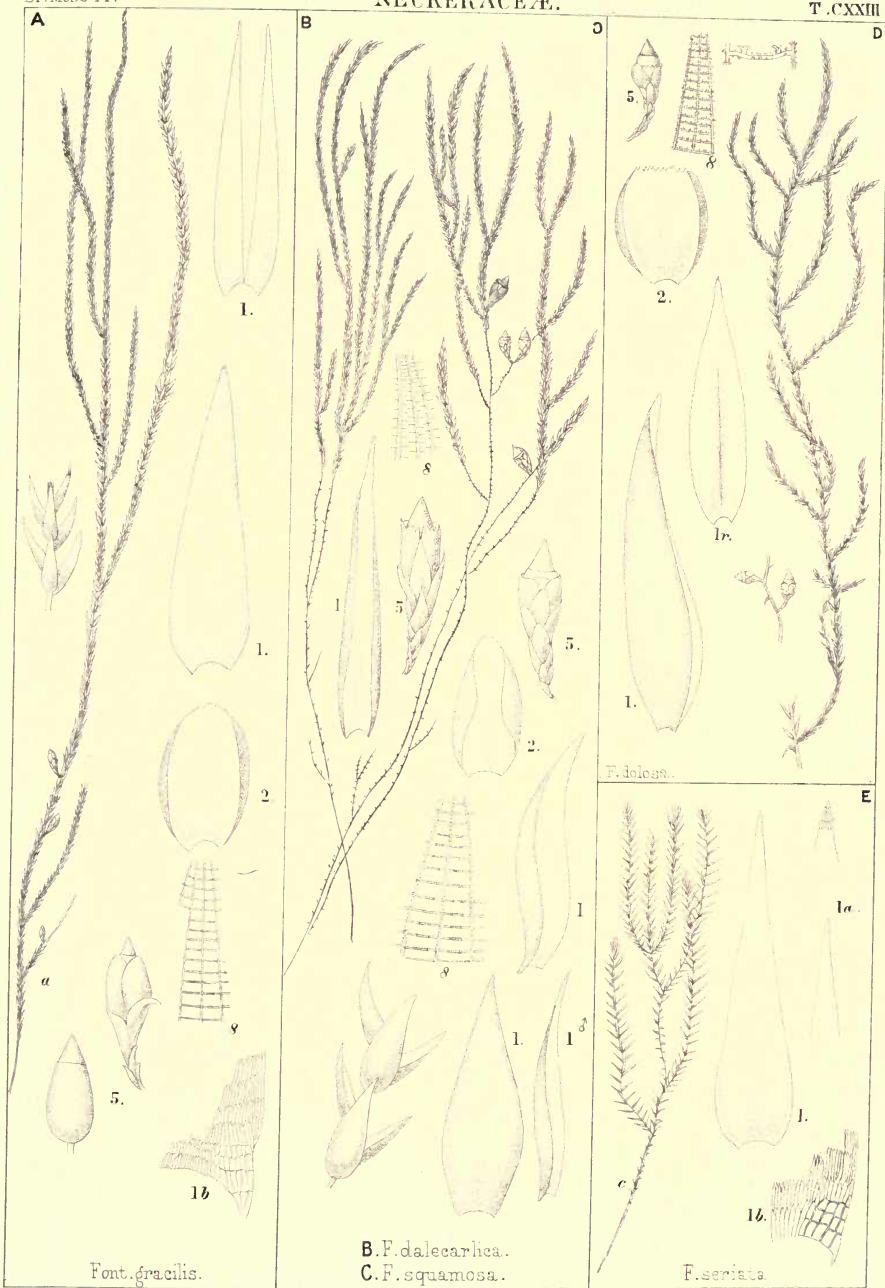


Font. Dixon.



Font. antipyretica.





Font. gracilis.

**B.F.dalecarlica.**

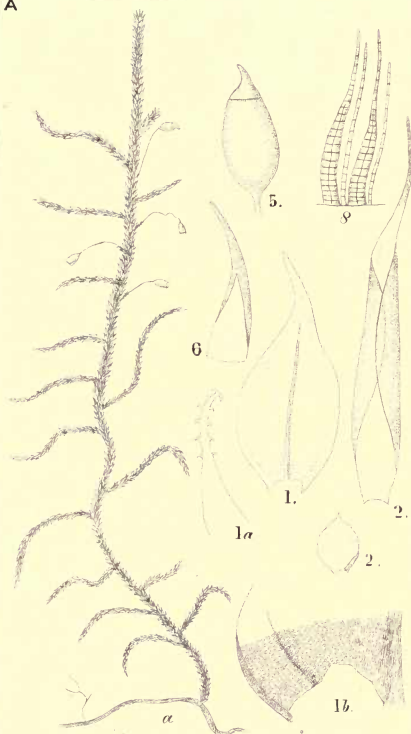
C.F. squamosa.

*F. seriata*.

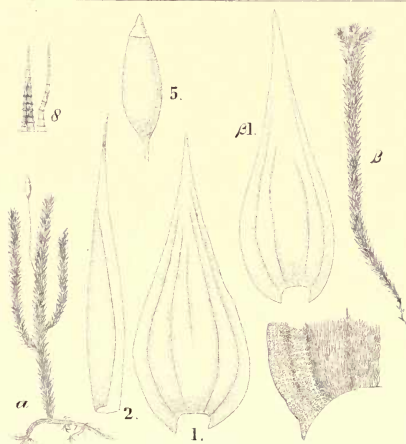




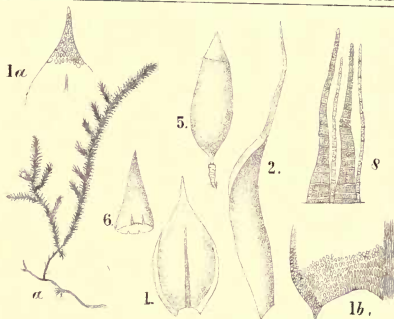
A

*Ant. curtipendula.*

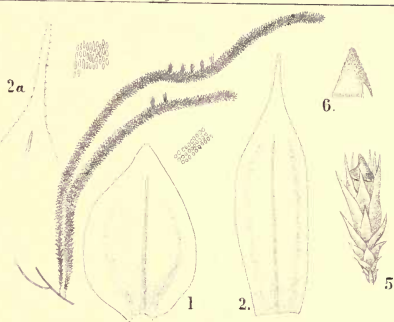
B

*Leuc. sciuroides.*

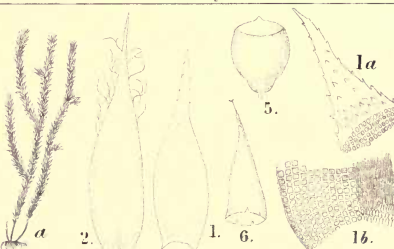
C

*Cryph. arborea.*

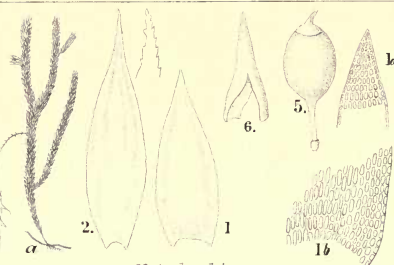
D

*Cr. Lampyi.*

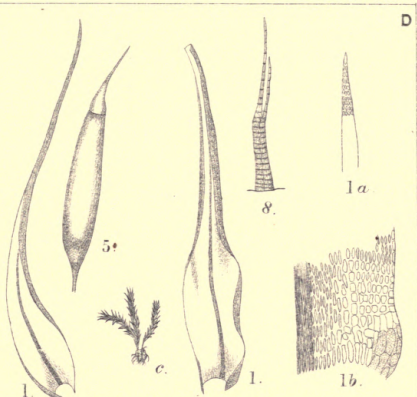
E

*Hed. albicans.*

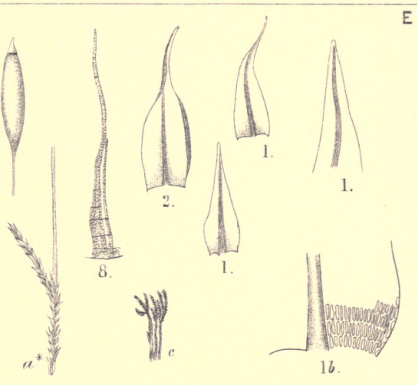
F

*H. imberbis.**Mintern. Brev. sc. et amp.*

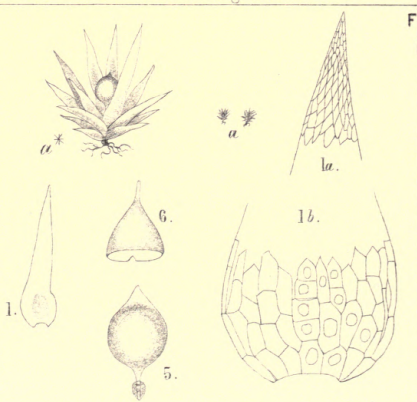




Dier. strictum.



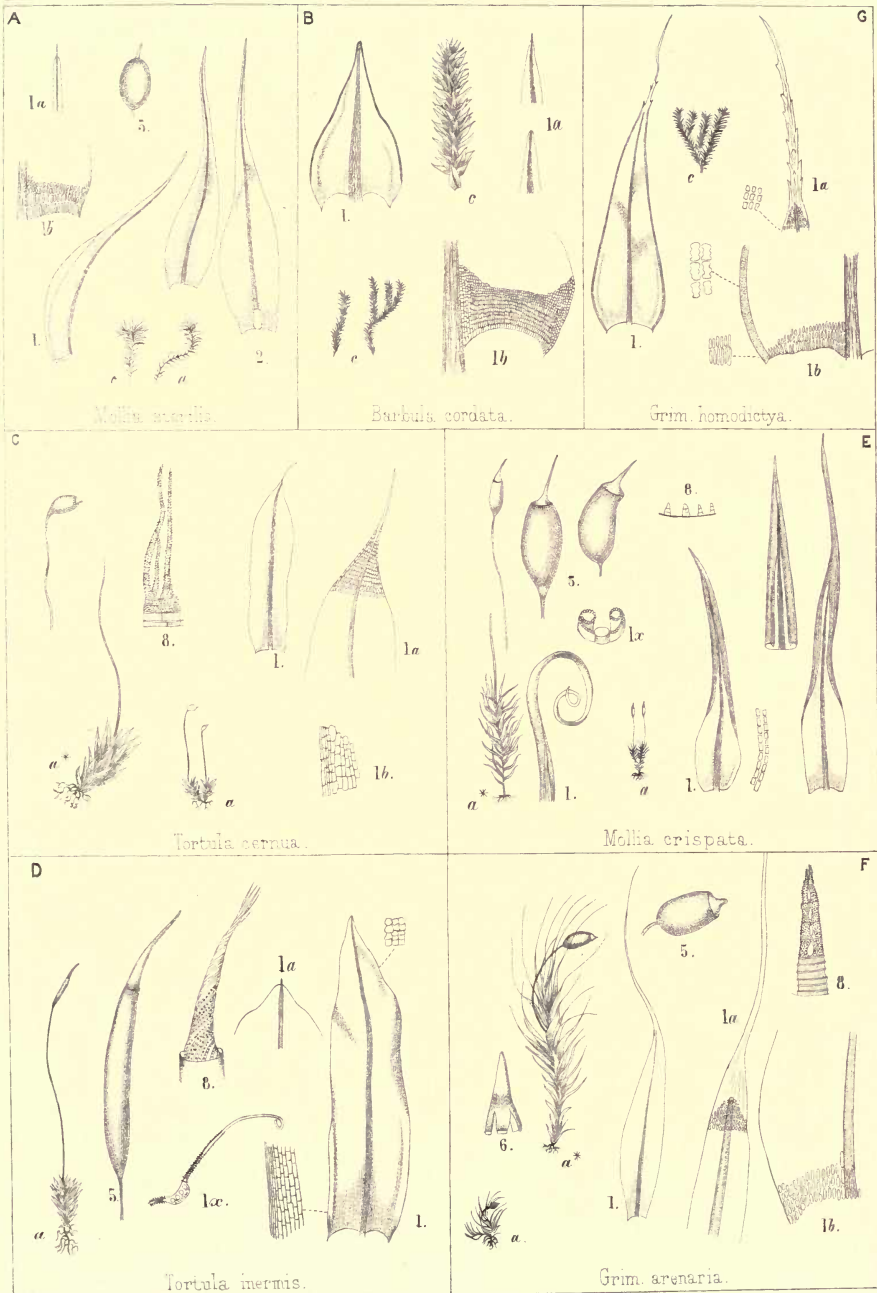
*Ditrich. vaginans.*



*Ephem. stellatum.*





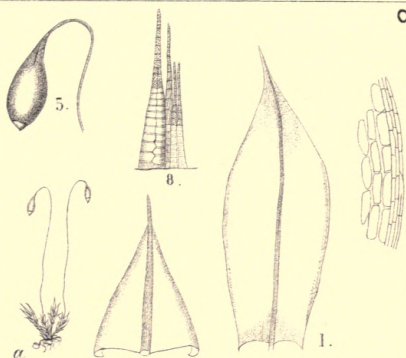




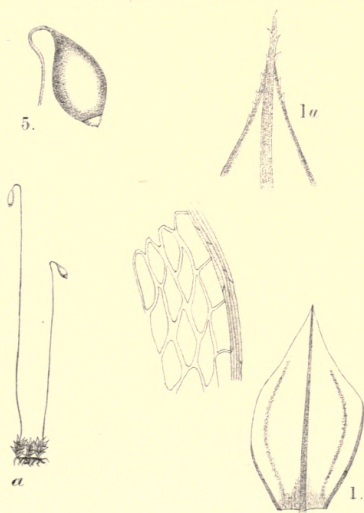
A

*Bryum arcticum.*

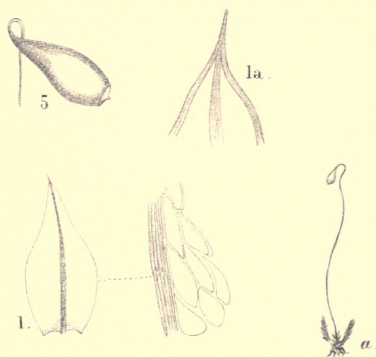
C



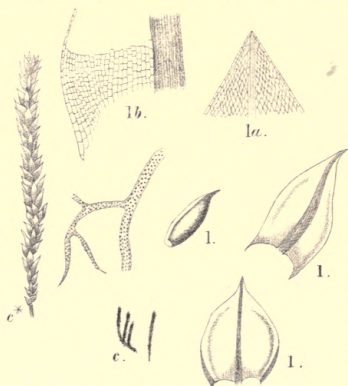
B

*Bryum mamillatum.*

D

*Bryum Lawersianum*

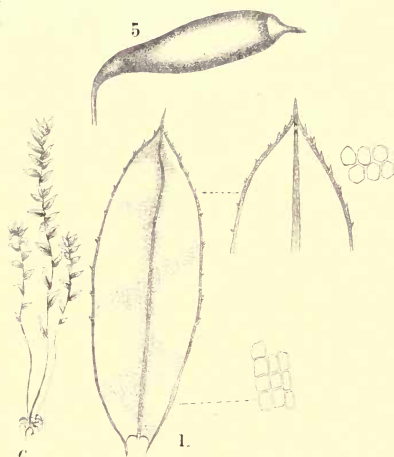
E

*Bryum Dixoni.*

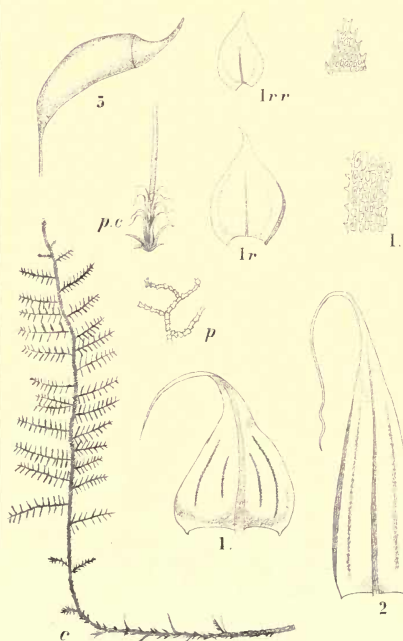




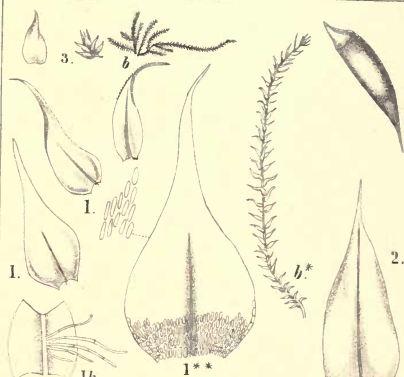
A

*Mnium lycopodioides.*

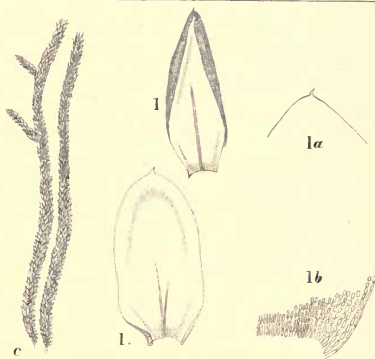
B

*Thuidium Philiberti.*R. Braithwaite ad nat. del<sup>t</sup>.

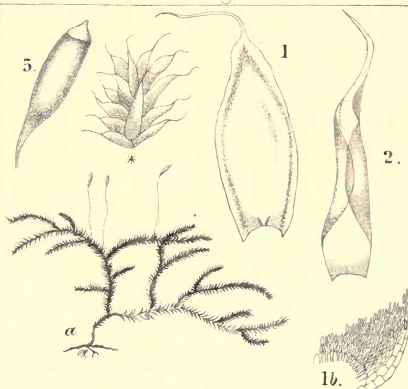
C

*Amblyopogon compactum.*

D

*Amblyopogon turgescens.*

E

*Plagiolophum.*

Munten Bros. sc et imp.











\*QK

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B73b The British  
1887 moss-flora.  
v.3

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